EFFECTIVENESS OF BREATHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN SELECTED HOSPITALS, COIMBATORE

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A DISSERTATION SUBMITTED TO THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY, CHENNAI IN PARTIAL FULLFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE IN NURSING

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CERTIFICATE

This is to certify that the dissertation entitled **“effectiveness of breathing exercises as play way method on respiratory parameters among children with lower respiratory tract infections in selected hospitals, Coimbatore”** is a bonafide work done by Ms. Josmy George M.Sc(N) II year Bishop’s college of nursing, Dharapuram in partial fulfillment of the university rules and regulations for award of masters of science in nursing under my guidance and supervision during the academic year 2013-2015.

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"Our talents are the gift that God gives us; what we make of our talents is our gift back to God"

Menaghan E.G

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ABSTRACT

Breathing brings a steady supply of fresh air to the lungs, where gas exchange takes place. In children older than newborns, the intercostal muscles also contract. This raises the ribs and stretches the parietal pleura even more. As the pleura stretches, the air pressure in the pleural cavity gets lower causes gas exchange easier.

Lower respiratory tract infections are breathing disorders caused due to the narrowing and inflammation of the airways in the lungs. Wheezing, Breathlessness, rapid breathing and cough are some prominent symptoms of lower respiratory tract infections. The breathing patterns have to be manipulated with deep breathing and relaxation sessions. This will help the children to control respiratory muscles and improve their conditions.

Present study was aimed to evaluate the effectiveness of breathing exercises as a play way method on respiratory parameters among children with lower respiratory tract infections in selected hospitals, Coimbatore.

An Evaluative approach was used to assess the effectiveness of breathing exercises as play way method. The research design used was quasi experimental non equivalent control group pre test post test design. The conceptual frame work for the study was based on modified Pender’s health promotion model (revised 2002). The convenient sampling technique was used to select the samples, 30 samples for the experimental group and 30 samples for the control group. Demographic variables and pre test were conducted on the first day for both experimental and control group to assess the peak expiratory flow rate and forced expiratory volume by using micro life digital peak flow

meter. In experimental group the intervention of breathing exercises as play way method was taught to the child and made them to do the exercises daily, 30 minutes for 5 consecutive days in the morning and evening. In control group the existing hospital routine was followed. On the 5th day post test was done in both experimental and control group. The data gathered were analysed using descriptive and inferential statistics. There is a significant difference in the paired 't' test regarding respiratory parameters among children with lower respiratory tract infections such as peak flow rate ('t'=8.54) and forced expiratory volume ('t'=7.2) at $p<0.05$ level of significance. There is significant difference in independent 't' test regarding respiratory parameters such as peak expiratory flow rate (t=7.82) and forced expiratory volume (t=4.49) at $p<0.05$ level of significance between experimental and control group. There was a significant association found between peak flow rates in relation to frequency of attacks in the last year (χ^2 =11.71) at ($P < 0.05$) level of significance. No significant association was found between peak flow rates with their selected demographic variables in experimental group. There was no significant association found between forced expiratory volumes with the selected demographic variables in experimental group.

The study findings revealed that there was significant improvement in respiratory parameters in experimental group. Hence breathing exercises as play way method were beneficial among children with lower respiratory tract infections.

CHAPTER – I

i) INTRODUCTION

"We live in an ocean of air, by breathing we are attuned to atmosphere. The breath holds the secret to the highest bliss"

-Alexander Lowen

BACKROUND OF THE STUDY

Children are adorable. They are like divine gifts that parents get from the almighty. Their eyes are full of innocence. They smile when they receive love and admiration, they cry when it is their first day at school away from their parents, they giggle when they mingle with their buddies, and they signify nothing but the pure and faithful love. They truly symbolise God.

Children's Day., (2013)

A good start in life is important to the health and wellbeing of children. Childhood is a complex area with many factors combining to influence children's health and development. A child's health and wellbeing depends on what happens to them as individuals, as part of a family, as members of community and within society as a whole.

Australian government department of health., (2012)

Illness leads not only to physical impairment and functional limitation but also psychological stress resulting in tension and anxiety. Illness of the child also engulfs the whole family in a vicious cycle of apprehension, anxiety, helplessness and disturbed lifestyle.

Gupta.P., (2004)

Children come into contact with many germs through sharing, playing and interacting with others and their environment. It was reported that respiratory infections are the top most diagnosed illnesses at pediatric doctor visits.

Janelle Vaesa., (2010)

Lower respiratory tract infection is inflammation of the airways/ pulmonary tissue, due to viral or bacterial infection, below the level of the larynx. Gastro-esophageal reflux may cause a chemical pneumonitis. Smoke and chemical inhalation may also cause pulmonary inflammation.

Olsen K, Lozano., (2013)

The severity of lower respiratory tract infections in children is worse in developing countries, resulting in a higher case-fatality rate. Although medical care can to some extent mitigate both severity and fatality, many severe lower respiratory tract infections do not respond to therapy, largely because of the lack of highly effective antiviral drugs.

Ramanan Laxminarayan., (2006)

Acute respiratory infections are not confined to the respiratory tract and have systemic effects because of possible extension of infection or microbial toxins, inflammation, and reduced lung function

Eric A. F. Simoes., (2006)

Lower respiratory tract infection is a generic term for an acute infection of the trachea (windpipe), airways and lungs, which make up the lower respiratory system. It includes bronchitis, bronchiolitis, wheezing associated lower respiratory tract infections, croup and pneumonia.

Mizgerd J P.,(2008)

Pneumonia, inflammation of the pulmonary parenchyma, is common in childhood but occur more frequently in infancy and early childhood. Clinically, pneumonia may occur either as a primary disease or as a complication of another illness.

Wong's., (2009)

Wheezing is common throughout childhood, except in the immediate neonatal period, when it relatively rare. In the year of 2011 the prevalence of wheeze among school children are 25-38% in UK.

Younglin Leo Lee., (2012)

Bronchitis can be acute or chronic. Acute bronchitis is most often caused by a number of viruses that can infect the respiratory tract and attack the bronchial tubes like RSV and adenovirus. Infection by certain bacteria can also cause acute bronchitis such as streptococci and Hemophilus Influenza.

Health Encyclopedia., (2012)

Chronic bronchitis is a common and debilitating disease, which effects between 8 and 12 % of children globally and despite improvements in air quality in developed countries. The main risk factor for developing chronic bronchitis is passive smoke exposure, but environmental air quality remains an important contributing factor in the developing world.

Elizabeth Sapey and Robert A Stockley., (2011)

Bronchiolitis is a common illness of the respiratory tract caused by an infection that affects the tiny airways, called the bronchioles, that lead to the lungs. As these airways become inflamed, they swell and fill with mucus, which can make breathing difficult.

Kids Health., (2014)

Complications can be developed during the acute course of lower respiratory tract infections. Apart from pleural effusions and skin exanthems, several major complications were noted. These were septicaemia , apnoea , encephalopathy , meningitis , Stevens Johnson Syndrome bronchiectasis and lung abscess.

Catherine DeAngelis et al.,(2010)

As the children grow rapidly, they have a higher resting metabolic rate and oxygen consumption because they have a larger surface area per unit body weight. In addition to an increased need for oxygen relative to their size, children have narrower airways. Thus, inflammation of the airway can result in potentially significant obstruction in the airways of young children.

American Academy of Paediatrics.,(2012)

The respiratory tract infections affect the academic performance of the school aged children. In India about 11% of children with lower respiratory tract infections missed school. Per 100 elementary and high school-aged children, 58 and 80 school hours, respectively, are missed annually. Parents averaged 2.5 absent days from work per year because of their children's health problems.

Mulligan R et al.,(2012)

In managing breathing problems, certain herbal remedies may help by improving the airflow, clearing mucus congestion and boosting the lung function. The inflammation of the respiratory tract can constrict airways, fill lungs with mucus and reduce lungs' air capacity.

Sarah Terry., (2013)

Respiratory hygiene should be encouraged for patients and accompanying individuals who have signs and symptoms of respiratory infections beginning at the point of initial encounter in any healthcare setting. Respiratory hygiene includes coughing into one's sleeve and using tissues and, masks when coughing, sneezing, or for controlling nasal secretions.

Public Health Agency of Canada., (2012)

Recent studies have confirmed that routine zinc supplementation for more than three months does have a positive effect on reducing the duration of acute lower respiratory tract infections among children in developing countries.

WHO.,(2011)

A combination of echinacea, propolis, and ascorbic acid decreased the number of lower respiratory tract infections (LRTI) episodes, the duration of symptoms, and the number of days of illness. Stress-management therapy reduced the duration of LRTI compared with relaxation therapy with guided imagery or standard care

Roxane R. Carr., (2006)

Education of parents and child is an important aspect of lower respiratory tract infections treatment. Parents should also be asked to maintain a record of daily symptoms such as cough, wheeze and breathlessness, sleep disturbance, absence from school due to illness and medication required to keep the child symptom free is advised.

Ghai.O.P., (2004)

Oscillatory techniques such as high-frequency chest wall oscillation and intrapulmonary percussive ventilation should be considered in children who have difficulty mobilising secretions or who have persistent atelectasis, despite use of other airway clearance techniques

Jeremy Hull., (2010)

Children with respiratory infections might find that specific breathing exercises and physical exercise can help their condition. Some hospitals run rehabilitation courses for children with lung infections. Specific breathing exercises and a little physical activity can help children to facilitate health by alleviating symptoms.

George Krucik., (2010)

Children with lower respiratory tract infections can be treated with gravity assisted bronchial drainage and both manual and mechanical percussion and vibration. Both treatment produced improvement in expiratory flow rate, indicating improved airway status.

Jan Stephen Tecklin., (2009)

When performing abdominal breathing, child able to breathe more deeply in lungs. Exhale via mouth, and then tighten abdominal muscles. This helps to squeeze remaining air from the lungs, helping to breathe more fully thereby initiating mobilization of the secretions in the airways.

American Medical student's Associations (2006)

Breathing exercises enlarges the trachea bronchial tree enabling air to circulate around and through secretions that are not affected by usual tidal volume. Incorporation of play helps to extend the expiratory time and increase expiratory pressure. Play which include blowing a pinwheel toys, moving small items by blowing through straw, blowing cotton ball or a ping pong ball on a table, preventing tissue from falling, blowing balloons, sing loudly, blowing soap bubbles

Wong's., (2008)

Pediatric nurses are in a position to identify the knowledge, attitude and practice of lower respiratory tract infections in children. This will enable the nurse to plan with specialized service to help the children to understand about breathing exercises that will make a significant difference causing improvement in lung function.

KA Cameron., (2008)

NEED FOR THE STUDY

Children are not 'little adults' they are in a dynamic process of growth and development, and are particularly vulnerable to acute and chronic effects of pollutants in their environment, which leads to diseases like acute respiratory infections(ARI), diarrhea etc. Among these infectious diseases ARI is one of the leading causes of mortality and morbidity in young children.

World Health Organization., (2011)

Acute respiratory infections (ARI), particularly lower respiratory tract infections (LRTI), are the leading cause of death among children and are estimated to be responsible for between 1.9 million and 2.2 million childhood deaths globally.

Klugman.et al.,(2012)

In worldwide, Lower respiratory tract infections among children place a considerable strain and serious on the health budget. In 2008 lower respiratory tract infections was the leading cause of deaths among all infectious diseases, and they accounted for 3.9 million deaths.

Egore.R., (2008)

The estimated median incidence of lower respiratory tract infection in developing countries are 44 episodes per 100 child/year, equal to approximately 150.7 million new cases each year, 7 to 13 percent of which were severe enough to warrant hospitalization

Rudan et al., (2011)

Estimates of WHO in 2010 reveals clinical pneumonia incidence are highest in South-East Asia (0.36 episodes per child-year), closely followed by Africa (0.33 episodes per child-year) and by the Eastern Mediterranean (0.28 episodes per child-year), and lowest in the Western Pacific (0.22 episodes per child-year), the Americas (0.10 episodes per child-year) and European Regions (0.06 episodes per child-year).

World Health Organization., (2011)

In Southeast Asia, it was estimated that acute respiratory infections caused 4 million child deaths each year – 2.6 million in infants (0–1 years) and 1.4 million in school aged children. There are 450 million cases of pneumonia each year and that causes 3.9 million deaths. In the sub-Saharan region of Africa, 1 022 000 die and 702 000 die in south Asia.

Sona chawdary., (2008)

In India occurrence of ARI was found to be 22%, among 5-10 age group it was lower in urban area (17.2%) as compare to rural area (26.8%) higher in. A significant association was found between ARI and low social class, overcrowded houses low birth weight, delay start initiation of breast feeding, timely given complementary feeding and immunization status.

National Survey Report.,(2012)

In India, Acute respiratory infection is a serious problem accounting for 14.3 per cent deaths during infancy and 15.9 per cent deaths among children aged between 1-10 years in 2009

Kabra.S.K., (2010)

In tropical south India, most cases of bronchiolitis occurred in outbreaks during the rainy months of August through November, coinciding with respiratory syncytial virus outbreaks. Thus, bronchiolitis is primarily a viral syndrome in tropical region, just as it is in temperate regions. Eight (7%) children died ; 5 had roentgenographic pneumonia and the remaining had other abnormalities contributing to death; all had been treated with antibiotics

Cheriyan T et al., (2012)

In Andhra Pradesh, It was found that 19% of children under age 8, suffered from lower respiratory tract infections. Point prevalence of lower respiratory tract infections in AP was lower compared to Kerala, Madhya Pradesh and Orissa. Other states like Tamil Nadu, Karnataka and Maharashtra had lower point prevalence of lower respiratory tract infections.

Samatha.R., (2003)

In Tamilnadu, lower respiratory tract infection prevalence among school children aged 6-13 years were studied. Over all prevalence of LRTI was found to be 2.3 percent. Boys had a higher prevalence (3.1%) than girls (1.4%).

Behl.R.K., (2010)

In Coimbatore, the prevalence of lower respiratory tract infections is relatively high. ARIs are responsible for about 30-50% of outpatient visits to all health care facilities and about 20-40% of pediatric admissions to the hospitals.

Deepa.M., (2010)

Subramanian RK (2008), Investigated the effects of breathing exercise as recreation on respiratory parameters and oxygen saturation among children with respiratory infections (bronchitis, pneumonia) in Cohin, Kerala. Hospitalized children with respiratory infections (6-15 years, both genders) were randomized into the intervention group (n=18), which performed daily breathing exercise for 7 days, and a control group (n=18) which did not perform any breathing exercise. Comparison of the absolute changes of the parameters between the intervention and control group showed a significant difference in the peak flow rate [intervention group -2.50 (-4.00, -1.00), control group 0.00 (-1.00, 1.00), litres/min, $P<0.001$], mean oxygen saturation [intervention group -0.67 (-6.67, 1.33), control group 0.67 (0.00, 6.67), ($P<0.05$)].

Siva Priya et al (2010)., conducted study to create awareness in the health benefits of breathing games and to inculcate these practices among children in Thandalam. This study was designed to evaluate the effects of a 6 days daily breathing exercise practice on peak expiratory flow rate (PEFR), and forced expiatory volume in 1 sec (FEV_1) of children with lower respiratory infections for both sexes. 60 in patients aged 8 - 14 years admitted in paediatric wards, were recruited for the study. Children with diagnosis of lower respiratory infections were selected. The participants were performed breathing exercises during play in the morning and evening for a period of 6 days. The respiratory parameters PEFR, FEV_1 were measured before and after practice of breathing exercises. The results of this study showed significant increase in PEFR (148±19.6 to 204±21.04), FEV_1 (0.87±0.24 to 1.42±0.36) which is significant ($p<0.05$) after the practice of breathing games during play.

Vikram Mohan (2005)., conducted study aimed to determine the impact of breathing exercises in improving the dynamic pulmonary function parameters Forced Expiratory Volume in the first second (FEV_1), Forced Vital Capacity (FVC) and FEV_1/FVC % and respiratory `rate among children with lower respiratory tract illnesses like tuberculosis, pneumonia and chronic bronchitis in Hyderabad. 30 subjects recruited based on inclusion and exclusion criteria. Subjects were assigned to the experimental group and the control group through random sampling method. In the experimental group, subjects underwent exercises. While in the control group, no breathing exercises were performed. The results of the study showed, FEV1/FVC% in the experimental group significantly improved from 42% to 83% ($p<0.05$) than the control group, which means breathing exercises increased lung volume and lead to improved lung function. This study suggested the breathing exercises may be more effective in improving dynamic lung parameters especially FEV1/FVC%.

During clinical postings, the investigator had seen children diagnosed and hospitalized frequently with lower respiratory tract infections and found to have continuous cough, vomiting, and not taking food properly, increased school absenteeism and they were not having interest in activities. Family members were also looked worried. So the investigator intended to do a study on breathing exercises as play way method on respiratory parameters among children with lower respiratory tract infections.

STATEMENT OF THE PROBLEM

A study to evaluate the effectiveness of breathing exercises as play way method on respiratory parameters among children with Lower respiratory tract infections in selected Hospitals, Coimbatore.

OBJECTIVES

1. To assess the pre-test and post test scores of respiratory parameters among children with lower respiratory tract infections in experimental group.
2. To assess the pre- test and post test scores of respiratory parameters among children with lower respiratory tract infections in control group.
3. To compare the pretest and post test scores of respiratory parameters among children with lower respiratory tract infections in experimental group
4. To find the effectiveness of breathing exercises as play way method on respiratory parameters among children with lower respiratory tract infections between experimental and control group.
5. To find the association between the post test scores of respiratory parameters among children with lower respiratory tract infections with their selected demographic variables in experimental group.

OPERATIONAL DEFINITION

EFFECTIVENESS

Effectiveness means 'doing the right thing' and producing the intended results.

Kinderley., (2007)

In this study, it refers to determining the extent to which the breathing exercise has brought the significant difference in improvement of respiratory parameters among children with lower respiratory tract infections measured by using statistical measurements and its scores.

BREATHING EXERCISES AS PLAY WAY METHOD:

Breathing exercises as play way are to encourage child to take bigger, deeper breaths and to learn how to breathe out in different ways. This will help to move and clear secretions from their lungs and increase ventilation. Turn these exercises into games and fun activities to make them more enjoyable for the young children

Dr Andrew Weil. (2007)

In this study breathing exercises as play way methods refers to the exercises performed as play through various ways like blowing bubbles, blowing cotton wool balls, blow bottle exercise, pursed lip breathing, blowing balloons and candle and flower for a period of 30 minutes in the morning and evening for 5 consecutive days.

Blowing bubbles:

The child should take a deep breath in and then gently blow out through an 'O' shaped mouth of a bubble wand. Repeat 10 'blows'. As their technique improves, encourage the child to breathe out for longer and more fully.

James Highland., (2012)

Blowing Cotton wool balls:

Place a cotton wool ball on open, flat palm and ask child to take a deep breath in and then blow the ball off the hand to the maximum distance the child can. Repeat for several times at least 5 minutes.

James Highland., (2012)

Blow bottle exercise:

Blow bottle exercises improve the pulmonary function. Connect two Bottles with rubber tubing of 10mm diameter. Blow through the inlet tubing attached to the first bottle to facilitate the maximum escape of fluid to the second bottle within one blow. Repeat the blowing for 5minutes.

Barany M, Holmberg H.,(1997)

Pursed lip breathing:

Pursed lip breathing is the simplest way to control shortness of breath. Breath in slowly through the nose, puck or purse the lips gently and breath out slowly and gently as to flicker the flame of a candle. Repeat exercise for 5 minutes.

Linda Ray.,(2013)

Blowing Balloon:

Blowing balloons work out on the intercostal muscles responsible for spreading and elevating the diaphragm and rib cage. Grasp the balloon below the lip of the opening between the index finger and thumb. Take a deep breath and seal the lips around the balloon, blow the maximum of the air from the lungs to the balloon. Repeat this for 5 minutes.

Dr. Andrew Veil.,(2007)

Candle and flower:

This technique helps to deliver oxygen and also helps to eliminate waste in the body and helps maintaining the healthy cells. Have the child to take a deep breath through their nose as if they smell a flower then hold the breath for 2 seconds and release the breath slowly to blow off the lit candle. Repeat for 5 minutes.

Rick Rockwell.,(2013)

RESPIRATORY PARAMETERS

Respiratory Parameters are concern with measurable or quantifiable characteristic feature. Respiratory Parameters such as peak flow rate, forced vital capacity, forced expiratory volume, timed expiratory capacity, oxygen saturation level, blood gaseous composition and pressure.

Kindersley., (2007)

In this study, Respiratory parameter refers to peak flow rate and forced expiratory volume in 1 second measured by using a digital micro life peak flow meter.

PEAK FLOW RATE:

A peak expiratory flow rate is a measure of how fast air comes out of the lungs when exhale forcefully. This measure is called a peak flow or "PFR" and is measured in liters per minute. It is measured by using a micro life digital peak flow meter. The score is in percentage which is calculated by

$$\text{PEFR\%} = \frac{\text{Personal peak flow rate}}{\text{Predicted peak flow rate}} \times 100$$

Martin Stern., (2003)

FORCED EXPIRATORY VOLUME IN ONE SECOND:

Forced expiratory volume in one second is the measure of how much air can be exhaled in one second following the deep inhalation represented as FEV_1 is measured in liters. It is measured by using a micro life digital peak flow meter. The score is given in percentage which is calculated by

$$FEV1\% = \frac{\text{Personal } FEV_1}{\text{Predicted } FEV_1} \times 100$$

Wikipedia.; (2013)

CHILDREN:

Children are the young human being below the age of puberty.

Ghai O.P (2007)

In this study it refers to children between the age group of 5 – 12 years with lower respiratory tract infections.

LOWER RESPIRATORY TRACT INFECTIONS:

Lower respiratory tract infections are inflammation and infection of the airway, lung, bronchi, bronchioles and alveolus characterized by bronchitis, asthmatic bronchitis, bronchiolitis and pneumonia.

Adle.P., (2010)

In this study; lower respiratory tract infections refers to acute bronchitis, chronic bronchitis, asthmatic bronchitis (wheezing), bronchiolitis, and pneumonia**.**

HYPOTHESES

H_1 - The mean post test scores of respiratory parameters are significantly higher than the mean pre- test scores of respiratory parameters in experimental group.

H_2 - The mean post test scores of respiratory parameters in the experimental group is significantly higher than the mean post test scores of respiratory parameters in control group.

H_3 - There is significant association between the post test scores of respiratory parameters among children with lower respiratory tract infections with their selected demographic variables in experimental group.

ASSUMPTIONS

- Children with Lower respiratory tract infections may have abnormal respiratory parameters.
- Nurses have an important role in reducing respiratory problems, improve breathing pattern and improve lung function in children with lower respiratory infections.

DELIMITATION

The study is delimited to

- Sample size was 60
- Data collection period was for 5 weeks.

PROJECTED OUTCOME

Breathing exercises maintain the respiratory status thus it improves the peak expiratory flow rate and forced expiratory volume among children with lower respiratory tract infections. It helps to reduce the cost and duration of treatment by mobilizing the secretions from the lungs and increasing the ventilation.

ii) CONCEPTUAL FRAME WORK

The conceptual frame work is comprised of interrelated concept that explains a natural phenomenon.

The study is designed to evaluate the effectiveness of breathing exercises as play way method on respiratory parameters among children with Lower respiratory tract infections. The conceptual model for the study is based on modification made on "Nola I J. Pender's Health Promotion Model (2002-Revised)".

The Health promotion (HPM) proposed by Nola J. Pender (1982; revised, 2002) was designed to be a "Complementary counterpart to models of health protection". It defines health as a positive, dynamic state not merely the absence of disease. Health promotion is directed at increasing a client's level of well being. The health promotion model describes the multi dimensional nature of persons as they interact with in their environment to pursue health.

The Model focuses on the following areas.

- ❖ Individual characteristics & experiences
- ❖ Behaviour specific knowledge & affect
- ❖ Behaviour outcome

INDIVIDUAL CHARACTERISTICS / EXPERIENCES

i) Prior related behaviour

According to the theorist, prior related behaviour describes frequency of the similar behaviour in the past direct and indirect effects on the likelihood of engaging in health promoting behaviour.

In this study the prior related behaviour includes the assessment of demographic variables, Pre assessment of respiratory parameters like peak flow rate and forced expiratory volume by using micro life digital peak flow meter.

ii) Personal factors

According to the theorist, personal factors are categorized as biological, psychological and socio-cultural. These factors are predictive of a given behaviour and shaped by the nature of the target behaviour being considered.

In this study the personal factors include age, sex, education, residence, religion, pet animals in house, type of allergy, duration of breast feeding, frequency of attack in last year and duration of illness.

BEHAVIOUR SPECIFIC COGNITIONS AND AFFECT

a) Perceived benefit of action

According to the theorist, perceived benefits of action are anticipated positive outcomes that will occur from health behaviour.

In this study the perceived benefits of action helps the child to reduce the episodes of lower respiratory tract infections and to promote lung function.

b) Perceived barriers of action

According to the theorist, perceived barriers actions are anticipated, imagined or real blocks and personal costs of understanding a given behaviour.

In this study the perceived barriers of action is children may have lack of knowledge, lack of practice and lack of motivation regarding breathing exercises.

c) Perceived self efficacy

According to the theorist, perceived self efficacy is judgement of personal capability to organize and execute a health promoting behaviour. Perceived self efficacy influences perceived barriers to action so higher efficacy results in lowered perceptions of barriers to the performance of the behaviour.

In this study the self efficacy is that child realizes the importance of breathing exercises to promote lung function and improve the knowledge and practice which will prevent the recurrent occurrence of lower respiratory tract infections.

d) Activity related affect

According to the theorist, activity related affect describes subjective positive or negative feelings occur before, during and following behaviour based on the stimulus properties of the behaviour itself. Activity related affect influence perceived self efficacy, which means the more positive the subjective feeling, the greater the feeling of efficacy. In turn, increased feeling of efficacy can generate further positive affect.

In this study activity related affect is reduced episodes of lower respiratory tract infections and improved respiratory parameters.

e) Interpersonal influences

According to this theorist, Interpersonal influences cognition concerning behaviours, beliefs, or attitudes of the others. Interpersonal influences include: norms (expectations of significant others), social support (Instrumental & emotional encouragement) and modeling (vicarious learning through observing others engaged in a particular behaviour). Primary sources of interpersonal influences are families, peers and health care providers.

In this study interpersonal influence is that Intervention of Breathing exercises as play way methods for improvement of respiratory parameters. The exercises programme includes 6 exercises such as, blowing bubbles, blowing Cotton wool balls. Blow bottle exercise, pursed lip breathing, balloon blowing and candle and flower. Each exercise is done 5 minutes in the morning and evening for 5 consecutive days. Each session includes 30 minutes.

f) Situational influences

According to this theorist situational influences are personal perceptions and cognitions of any given situation or context that can facilitate or impede behaviour Include perceptions of options available, demand characteristics and aesthetic features of the environment in which given health promoting is proposed to take place. Situational influences may have direct or indirect influences on health behaviour.

In this study situational influence is child need to modify the life style, breathing exercises and maintain health status which influence lung function and prevent recurrent occurrence of the respiratory infections.

BEHAVIOURAL OUTCOME

I. Immediate competing demands and preferences

According to the theory, competing demands are those alternative behaviours over which individuals have low control, because there are environmental contingencies such as work or family care responsibilities. Competing preferences are alternative behaviour over which individual exert relatively high control, such as choice of ice cream or apple for a snack.

In this study breathing exercises as play way method may influence the children to gain knowledge on exercises and practice them in reducing the occurrence of respiratory infections and improve lung function among children with lower respiratory tract infections.

II. Commitment to plan of action

According to the theorist Commitment of plan of action is the concept of intention and identification of a planned strategy leads of implementation of health behaviour.

In this study Commitment of plan of action is the child with lower respiratory tract infections develop positive attitude and makes decision to continue the practice of breathing exercises to healthy life style and maintain health status which improve lung function and prevent recurrent occurrence of the respiratory infections in future.

III. Health promoting behaviour

According to the theorist health promoting behaviour is an end point or action outcome directed toward attaining the health outcome such as optimal well being, personal fulfillment and productive living.

In this study health promoting behaviour of children with lower respiratory tract infections may practice breathing exercises to maintain health status which improve lung function and prevent recurrent occurrence of the respiratory infections.

Post test assessment

In this study Post test assessment of respiratory parameters such as peak flow rate and forced expiratory volume were done by using micro life digital peak flow meter in experimental group and control group. The peak flow rate was graded as normal, mild, moderate and severe. The forced expiratory volume was graded as normal, mild, moderate and severe.

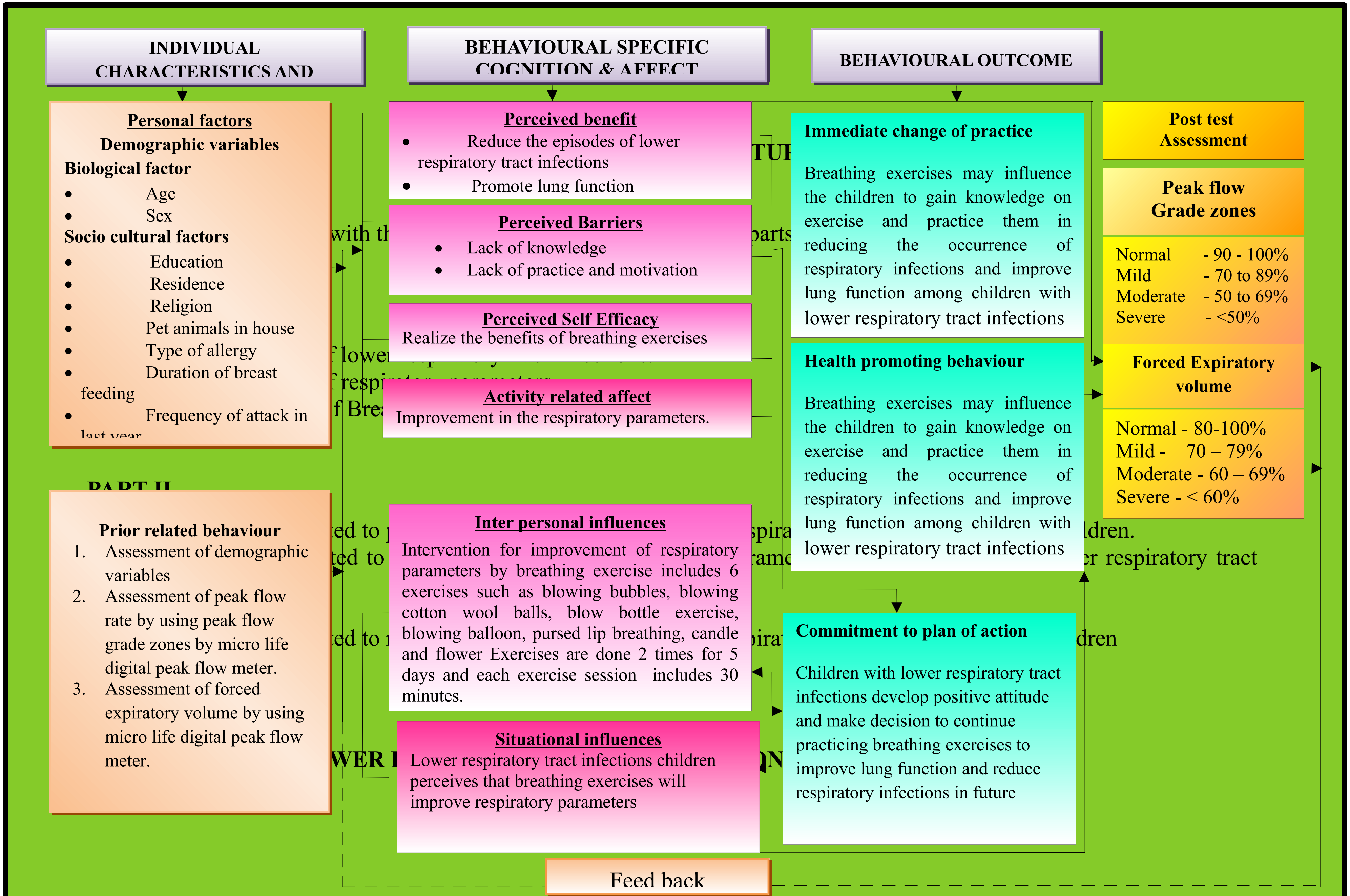


Fig 1: Conceptual framework adopted from modified Pender's Health Promotion Model (Revised 2002)

Acute respiratory tract infections are too common in infancy and childhood. Most children ordinarily have 2– 4 such infections a year, especially in crowded localities where the environment is literally teeming with potentially pathogenic bacteria and viruses, But protective mechanisms of the body often repel the pathogens. The defenses may be breached and some children are prone to get repeated infections

Viswanathan J., (2009)

DEFINITION

Lower respiratory tract infections are inflammation and infection of the airway, lung, bronchi, bronchioles and alveolus characterized by bronchitis, asthmatic bronchitis, bronchiolitis and pneumonia.

Adle.P.,(2010)

INCIDENCE

The estimated incidence of lower respiratory tract infection is 30 per 1,000 children per year in the in India. Data for children seen at hospital with pneumonia (clinical findings and CXR) found overall incidence rates of 14.4 per 10,000 children aged 0-16 years per annum. Boys are more often affected than girls. In Asia, about 3,370,000 cases of pneumonia are expected every year. Acute bronchitis is a short-term infection of the airways affecting between 30-50 children in every 1,000 per year.

W.H.O., (2013)

ETIOLOGY

Viral infections include the following:

- Adenovirus
- Influenza
- Parainfluenza
- Respiratory syncytial virus
- Rhinovirus
- Human bocavirus-
- Coxsackievirus
- Herpes simplex virus

Bacterial causative agents

- Streptococcus pneumoniae
- Moraxella catarrhalis
- Hemophilus influenzae
- Chlamydia pneumoniae
- Mycoplasma species

Other causes include the following:

- ❖ Inhaled environmental allergens such as house dust mites, smoke, hydrocarbons etc.
- ❖ Chronic aspiration
- ❖ Fungal infection
- ❖ Cigarette smoke exposure
- ❖ Industrial pollution
- ❖ Weather change
- ❖ Emotional factors
- ❖ Food
- ❖ Endocrine factors

Medscape (2012)

I) BRONCHITIS

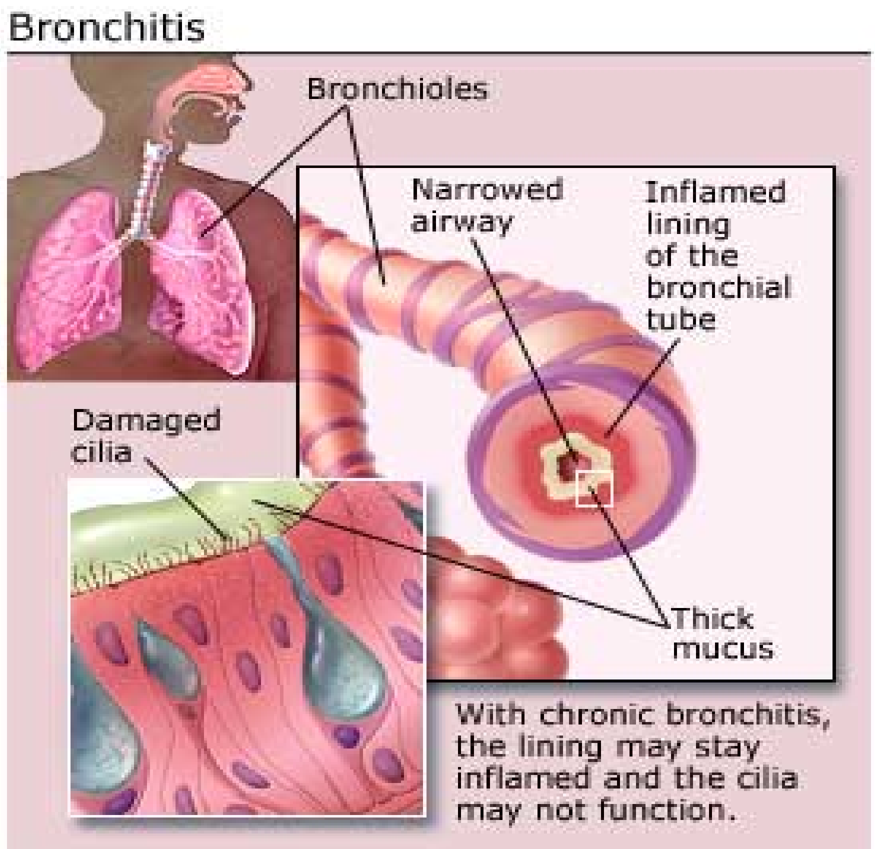
DEFINITION

Bronchitis may be acute or chronic, occur in association with a number of conditions such as viral or bacterial infection, allergic diseases etc. Acute bronchitis results from primary bacterial or viral infections. It is an inflammation of the lining of bronchial tubes, which carry air to and from the lungs.

Desai.A.B., (2006)

PATHOPHYSIOLOGY

Acute bronchitis occurs because of the inflammatory response of the mucous membranes within the lung's bronchial passages. Viruses, acting alone or together, account for most of these infections. In children, chronic bronchitis follows either an endogenous response to acute airway injury or continuous exposure to certain noxious environmental agents (eg, allergens or irritants). An airway that undergoes such an insult responds quickly with bronchospasm and cough, followed by inflammation, edema, and mucus production occurs. Mucociliary dysfunction is a common feature of chronic airway diseases. Airway surface lining depletion resulted in reduced mucus clearance causes mucous obstruction, goblet cell hyperplasia, and chronic inflammatory cell infiltration.


Bronchitis
Bronchioles
Narrowed airway
Inflamed lining of the bronchial tube
Damaged cilia
Thick mucus
With chronic bronchitis, the lining may stay inflamed and the cilia may not function.

Wong's., (2008)

II. ASTHMATIC BRONCHITIS (WHEEZING)

DEFINITION

Wheezing is a whistling sound that occurs during breathing when the airways are narrowed during exhalation. The sound is caused by air that is forced through airways that are narrower than normal. It is caused by Bronchospasm and Swelling of the lining of the airways.

Nelson., (2011)

PHENOTYPES OF WHEEZING

Virus-induced wheezing

It accounts for around two-third of all kinds of wheezing, is an intermittent form of recurrent airway obstruction with normal pre morbid lung function and subjects are asymptomatic between episodes. As these children have a favourable prognosis, they only need supportive treatment.

Multitrigger wheezing

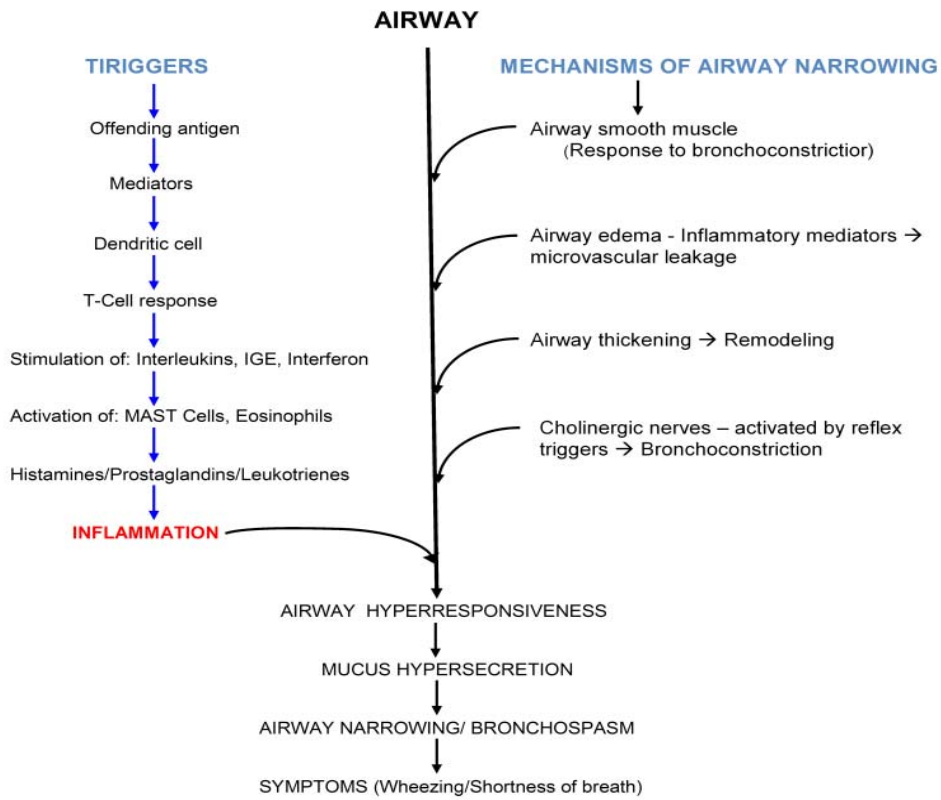
It is usually associated with allergy and is less prevalent in early life, manifesting during the school-going years. There is usually a family history of asthma and allergies. This form of wheezing tends to occur during and between episodes and is more likely to persist beyond early childhood, with associated significant deficits in lung growth up to 11 years of age.

Daniel Goh, MD et al., (2014)

PATHOPHYSIOLOGY

Infections appear to be more frequent trigger of airway narrowing in young children. It induces temporary bronchoconstriction. An infection interferes with the integrity of mucosal surface by opening up the tight intra epithelial cell junctions and thus induces the shedding of the epithelium. It results in mucosal edema and mucus secretion. Airway resistance is increased more during exhalation because airway closes prematurely during expiration. As a result lungs are hyper inflated, elasticity and frequency dependent compliance of lungs is reduced. Breathing involves more work resulting in dyspnea. Perfusion of inadequately ventilated lungs causes low PaO_2. The obstruction becomes more severe, alveolar hypoventilation supervenes. This leads to retention of CO_2 .

Wong's., (2005)


AIRWAY
TIRIGGERS
Offending antigen
Mediators
Dendritic cell
T-Cell response
Stimulation of: Interleukins, IGE, Interferon
Activation of: MAST Cells, Eosinophils
Histamines/Prostaglandins/Leukotrienes
INFLAMMATION
MECHANISMS OF AIRWAY NARROWING
Airway smooth muscle
(Response to bronchoconstrictior)
Airway edema - Inflammatory mediators → microvascular leakage
Airway thickening → Remodeling
Cholinergic nerves – activated by reflex triggers → Bronchoconstriction
AIRWAY HYPERRESPONSIVENESS
MUCUS HYPERSECRETION
AIRWAY NARROWING/ BRONCHOSPASM
SYMPTOMS (Wheezing/Shortness of breath)

III) BRONCHIOLITIS

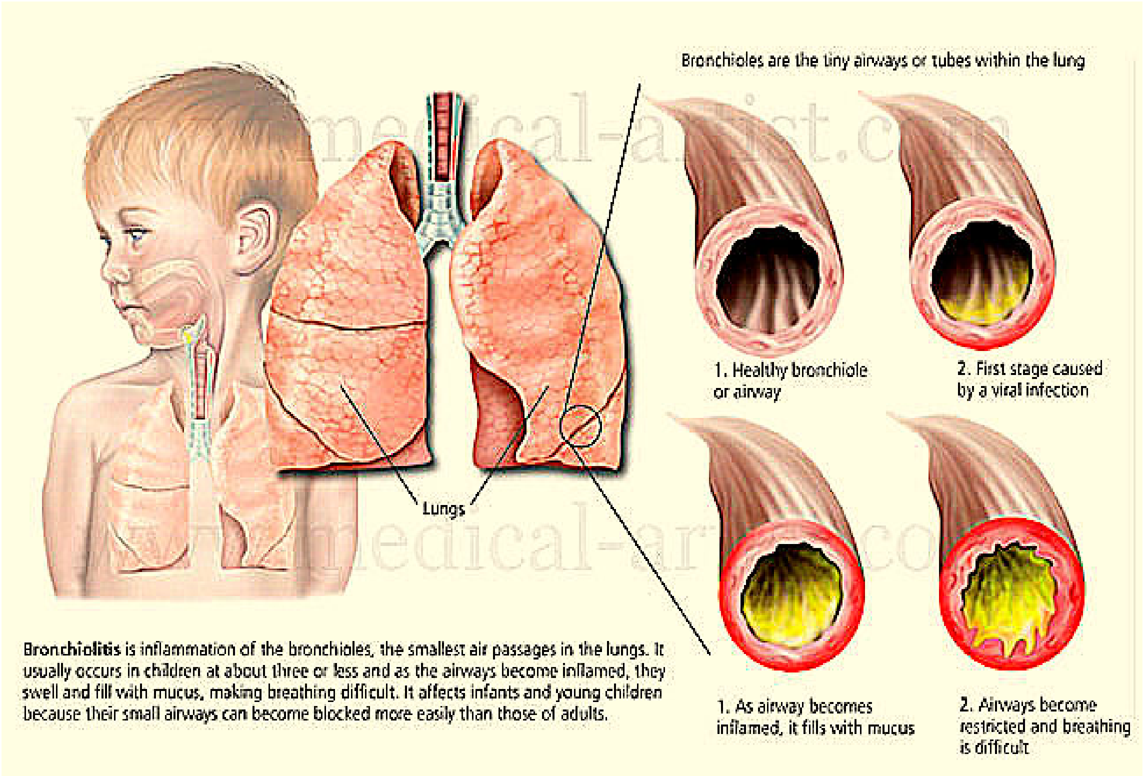
DEFINITION

Bronchiolitis is an acute typically viral infection of the bronchioles, occurring most often in young children. The infection causes inflammation in the bronchioles. Wheezing is a common manifestation of bronchitis and is caused by airway obstruction from edema and secretions.

Desai. A. B., (2006)

PATHOPHYSIOLOGY

Infection affects the epithelial cells of the respiratory tract. The ciliated cells swell, protrude into the lumen and lose their cilia. It produces fusion of the infected cell membrane of adjacent epithelial cells thus forming giant cells with multiple nuclei. At the cellular level this fusion result in multinucleated masses of protoplasm or syncytia being formed. The bronchiole mucosa swell and lumina are subsequently filled with mucus and exudates. The wall of the bronchi and bronchioles are infiltrated with inflammatory cells and peri bronchiolar interstitial pneumonitis is usually present. Because luminal cells are shed to the bronchioles when they die, the lumina are frequently obstructed particularly on expiration. The varying degrees of obstruction are present in small air passages lead to hyper inflation, obstructive emphysema, resulting from partial obstruction and patchy areas of atelectasis. Dilation of bronchial passages on expiration prevents air from leaving the lungs. The air is trapped distal to the obstruction and cause progressive over inflation.



Wong's., (2005)

IV. PNEUMONIA

DEFINITION

Pneumonia is the acute inflammation of the pulmonary parenchyma (the functional tissue of the organ distinguished from supportive or connective tissues) associated with alveolar consolidation.

Nikki l. Potts.,(2006)

CLASSIFICATION OF PNEUMONIA

- Bronchopneumonia – Begins in the terminal bronchioles which become clogged with mucopurulent exudates to form consolidated patches.
- Lobar pneumonia – one or more lobes of lung involved.
- Interstitial pneumonia – alveoli or interstitial tissue between them affected.

Wong's., (2008)

STAGES OF PNEUMONIA

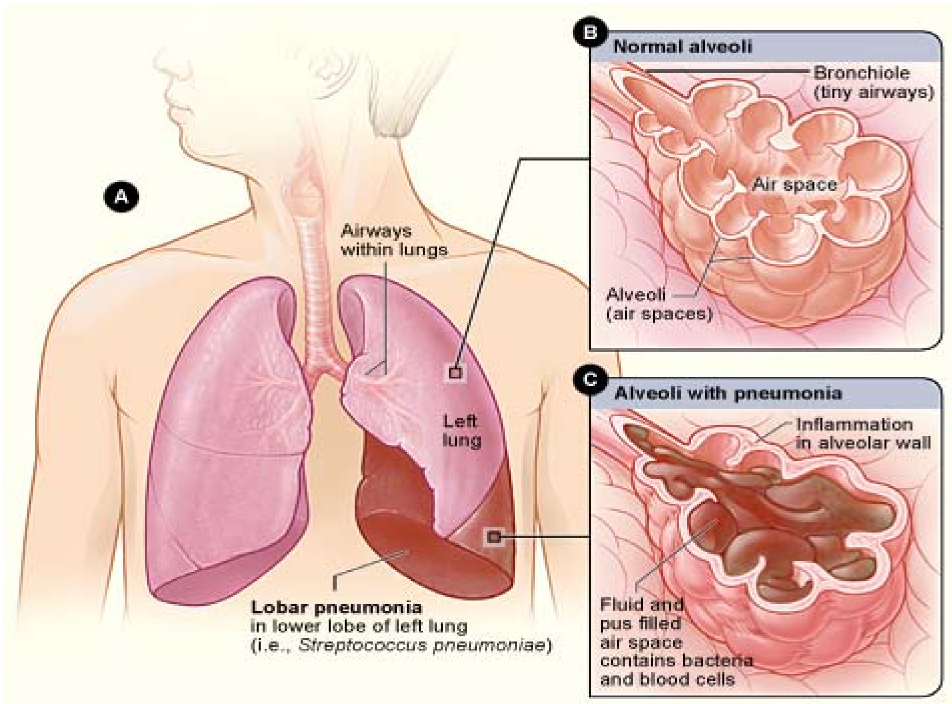
- **First stage**, congestion (day 1 - 2), the affected lung parenchyma is partially consolidated, and red-purple, partially aerated. Alveolar lumen contains serous exudate, bacteria and rare leucocytes.
- **Second stage**, red hepatization (day 3 - 4), the pulmonary lobe appears consolidate, red-brown, dry, firm, with a liver-like consistency. The surface is dry, rough the characteristic aspect of this stage is determined by the accumulation in the alveolar spaces of an exudate rich in fibrin, with bacteria, leucocytes, and erythrocytes. Alveolar walls are thickened due to capillary congestion and edema.
- **Third stage**, gray hepatization (day 5 - 7), the affected lobe has a liver-like consistency, with uniform gray colour. On the cut surface, a grayish purulent liquid drains. It is because alveolar lumens are filled with leukocytic exudate (neutrophils and macrophages, in order to remove the fibrin). Capillary congestion and edema are still present, therefore alveolar walls are thick.
- **The resolution stage** begins on day 8 and continues for 3 weeks, while the exudate within the alveolar spaces will be drained through lymphatics and airways with gradually aeration of the affected segment

Pathology Atlas.,(2014)

PATHOPHYSIOLOGY

Pathogens that manage to invade the susceptible individual release toxins and stimulate secondary and tertiary defence mechanisms. The toxins and by products of the body's defence damage pulmonary mucus membrane and cause accumulation of the debris and exudates in the airways. These effects lead to ventilation perfusion ratio abnormalities, causing hyper expansion and air trapping.

Barbara Mandeleco., (2006)



COMPLICATIONS:

- Pleural effusion
- Emphysema
- Atelectasis
- Lung abscess
- Pneumothorax

Richard.D., (2010)

CLINICAL MANIFESTATIONS

- Fever may reach 39.5 to 40.5 even with mild infections.
- Listless and irritable
- Meningeal signs without infection of the meninges
- Head ache, stiffness of the neck and back subsides as temperature drops
- Anorexia, Vomiting, Diarrhea, Abdominal pain
- Nasal blockage, Nasal discharge
- Cough, Hoarseness
- Grunting
- Stridor, Wheezing, crackles on auscultation
- Sore throat
- Enlarged cervical lymph nodes
- Inflamed mucus membrane
- Chest pain, Dyspnea
- Retractions, nasal flaring
- Pallor or cyanosis

Wong's., (2008)

DIAGNOSTIC EVALUATION

- History collection and physical examination
- Laboratory studies include gram stain and culture of the sputum, blood cultures, WBC count etc
- Culture of the nasopharyngeal secretions
- ASO titer if streptococcal infection is suspected
- Pulse oxymetry provides a continuous or intermittent non invasive method of determining O_2 saturation
- Cold agglutinin testing if mycoplasma infection are suspected
- Radiology identifies the extent and location of involvement
- Pulmonary function test, the important parameters include PEFR, FEV_1, FVC, $FEV_{25\text{-}75}$. All parameters are decreased in severe obstruction.

Viswanathan J.,(2006)

ALERT TO RESPIRATORY DISTRESS

- Cyanosis in severe cases
- Grunting and nasal flaring
- Marked tachypnoea
- Chest indrawing

- Other signs such as sub costal retraction, abdominal 'see-saw' breathing and tripod positioning.
- Reduced oxygen saturation (less than 95%).

Richard.D., (2010)

COMPLICATIONS AND PROGNOSIS

- Bacterial invasion of lung tissue can cause pneumonic consolidation, septicaemia, empyema, lung abscess and pleural effusion.
- Respiratory failure, hypoxia and death are rare unless there is previous lung disease or the patient is immunocompromised. **Richard.D., (2010)**

MANAGEMENT

Medical Management

- Beta-lactam antibiotics (eg, amoxicillin, cefuroxime, cefdinir) are preferred for outpatient management. Macrolide antibiotics (eg, azithromycin, clarithromycin) are useful in most school-aged children to cover the atypical organisms and pneumococcus.
- Aciclovir is used for herpes virus pneumonia.
- Vancomycin may be added to treatment of toxic-looking children
- Use of analgesics and antipyretics for the symptomatic management of fever and pain.
- In chronic bronchitis, bronchodilator therapy should be considered and instituted, oral corticosteroids should be added.

- Acetaminophen (Tylenol, Aspirin-Free Anacin, Feverall) is the treatment of choice for pain
- Wheezing should be treated with bronchodilators and not antibiotics, with additional corticosteroids if the wheezing is severe.
- Short-acting β2 agonists are the treatment of choice for intermittent and acute asthma episodes in very young children. Oral administration of this drug is also effective, but there are systemic side effects, while intravenous infusion use is limited to very severe acute wheeze in young children.
- Leukotriene receptor antagonists are suggested for the treatment of viral induced wheeze to reduce the frequency of exacerbations in young children.
- Monteleukast 4mg once daily for the episodic wheeze and inhaled cortisone can be given.

European Respiratory Society (2009)

OTHER THERAPIES

Oxygen Therapy:

Oxygen is delivered by mask, nasal cannula, tent, hood, face tent or ventilator. The mode of delivery id determined based on the concentration needed and the child's ability to cooperate in its use.

Aerosol Therapy

It is effective in depositing the medications directly into the airway. Bronchodilators, steroids, antibiotics suspended in particulate form can be inhaled so that medication reaches the small airways.

- **Hand held nebulizers**

The medicated mist is discharged into a small plastic mask, which the child holds over the nose and mouth. The child is instructed to take small deep breaths through an open mouth during treatment.

- **Metered dose inhaler (MDI)**

It is a self contained hand held device that allows intermitted delivery of specified amount of medication. For young children a spacer device or holding chamber is attached to MDI can help to coordinate breathing and aerosol delivery.

Bronchial or Postural drainage

It is indicated whenever the excessive fluid or mucus is not removed by normal ciliary activity and cough. Positioning the child to take maximum advantage of gravity facilitate removal of secretions.

Chest physiotherapy

Chest physiotherapy with adjunctive techniques is thought to enhance the clearance of mucus from the airway which includes manual percussion, vibration and squeezing of the chest.

Breathing exercises:

It enlarges the trachea bronchial tree enabling air to circulate around and through secretions that are not affected by usual tidal volume. Incorporation of play helps to extend the expiratory time and increase expiratory pressure. These play include blowing a pinwheel toys, moving small items by blowing through straw, blowing cotton ball or a ping pong ball on a table, preventing tissue from falling, blowing balloons, sing loudly, blowing soap bubbles.

Wong’s., (2008)

NURSING MANAGEMENT

Promote Rest

Bed rest can be provided for children during acute phase of illness.

Promote comfort

Correct administration of nasal drops and throat irritations instillation of saline nasal drops may clear air passages and promote feeding. Vasoconstrictive nasal drops can be administered 15- 20 minutes before feeding and at bed time for older children. Hot or cold applications sometimes provide relief an ice bag or heating pad applied to neck decreases discomfort.

Prevent spread of infection

Careful hand washing is carried out to prevent infection. Use tissue to cover the nose and mouth when cough or sneeze and dispose it properly. Do not share drinking cups, wash cloths and towels. Isolate the children from others.

Reduce Temperature

Antipyretics such as ibuprofen or acetaminophen reduce temperature and chances of dehydration.

Promote hydration

Adequate fluid intake is encouraged. Oral rehydration solution can be considered. Fluid should not be forced. Observe for frequency of voiding and intake of fluids.

Provide nutrition

Children can be permitted to determine their own need of food. Urging food on anoxic children causes nausea and vomiting can cause aversion to feeding.

Nikki L.Potts., (2006)

PREVENTION

- Vaccination help prevent LRTIs, mostly against influenza viruses, adenoviruses, measles, rubella, streptococcus pneumoniae, haemophilus influenzae, diphtheria, bacillus anthracis, and bordetella pertussis.
- Smoking in the home is a major risk factor for all childhood respiratory infection.
- Zinc supplementation reduces the incidence of pneumonia by over 40% in malnourished children
- Early identification and treatment
- Avoid irritants in the air, avoid children come into contact with the pet animals
- Drink more liquids, Eat healthy foods, Get more rest
- Use a humidifier or vaporizer
- Washing hands regularly
- Avoiding cold, damp locations or areas with a lot of air pollution
- Wearing a mask around people who are coughing and sneezing

Wong's., (2009)

2) OVERVIEW OF RESPIRATORY PARAMETERS

A great deal can be learned about the mechanical properties of the lungs from measurements of forced maximal expiration and inspiration. Since Hutchinson first developed the spirometer in 1846, measurements of the so-called dynamic lung volumes and of maximal flow rates have been used in the detection and quantification of diseases affecting the respiratory system. Over the years it has become obvious that the spirometer and peak flow meter used to measure ventilatory function are as deserving of a place in the diagnosis of respiratory diseases. It is important to appreciate that the clinical value of measurements is critically dependent on the correct operation and accuracy of the instrument, performance of the correct breathing manoeuvre and use of relevant predicted normal values.

David P. Johns., (2004)

INDICATIONS

- Establish baseline lung function,
- Evaluate dyspnea
- Detect pulmonary disease
- Monitor effects of therapies used to treat respiratory disease
- Evaluate respiratory impairment
- Evaluate operative risk
- Perform surveillance for occupational-related lung disease.

Nelson., (2006)

CONTRAINDICATIONS

- Hemoptysis of unknown origin
- Pneumothorax
- Thoracic aneurysms
- Abdominal aneurysms
- Cerebral aneurysms
- Recent eye surgery (within 2 weeks due to increased intraocular pressure during forced expiration)

- Recent abdominal or thoracic surgical procedures
- Patients with a history of syncope associated with forced exhalation.

Rudan et al., (2010)

MEASUREMENT OF VENTILATORY FUNCTION

Conventionally, a spirometer is a device used to measure timed expired and inspired volumes, and from these we can calculate how effectively and how quickly the lungs can be emptied and filled. A poorly performed manoeuvre is usually characterised by poor reproducibility. The measurements which are usually made are as follows:

VC (vital capacity)

It is the maximum volume of air which can be exhaled or inspired during either a maximally forced (**FVC**) or a slow (**VC**) manoeuvre. VC is normally equal to FVC unless airflow obstruction is present, in which case VC is usually higher than FVC.

FEV1 (forced expired volume in one second)

It is the volume expired in the first second of maximal expiration after a maximal inspiration and is a useful measure of how quickly full lungs can be emptied.

FEV1/VC (or **FEV1/FVC**)

It is the FEV1 expressed as a percentage of the VC or FVC (whichever volume is larger) and gives a clinically useful index of airflow limitation.

FEF25-75%

It is the average expired flow over the middle half of the FVC manoeuvre and is regarded as a more sensitive measure of small airways narrowing than FEV1. Unfortunately FEF25-75% has a wide range of normality, is less reproducible than FEV1, and is difficult to interpret if the VC (or FVC) is reduced or increased.

PEF (peak expiratory flow)

It is the maximal expiratory flow rate achieved and this occurs very early in the forced expiratory manoeuvre.

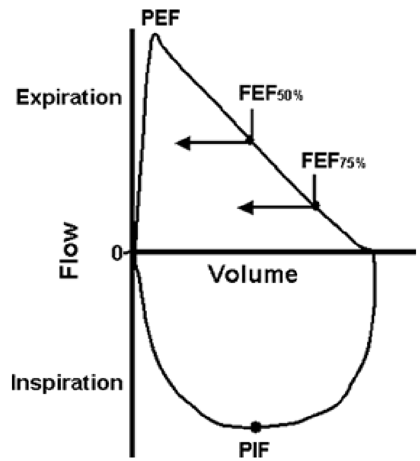
FEF50% and FEF75% (forced expiratory flow at 50% or 75% FVC)

It is the maximal expiratory flow measured at the point where 50% of the FVC has been expired (FEF50%) and after 75% has been expired (FEF75%). Both indices have a wide range of normality but are usually reproducible in a given subject provided the FVC is reproducible.

FVC6

It is the forced expiratory volume during the first 6 seconds and is a surrogate of the FVC. The FVC6 (and FEV1/FVC6) is gaining popularity because stopping the expiratory manoeuvre after 6 seconds is less demanding and easier to perform for patients with airflow obstruction and the elderly yet is similar to conventional FVC and FEV1/FVC for diagnosing and grading airflow obstruction.

Pierce R., (2006)



MONITORING DEVICES

Mechanical devices for personal use by patients, such as the peak flow meter, have been available for several decades for serial monitoring of lung function and have proven useful in the management of asthma. Most peak flow meters are robust and provide reproducible results essential for serial monitoring. However, they often have limited accuracy and, because they provide only a single effort-dependent index of ventilatory function, they have limited application in the initial assessment of respiratory diseases. Measurements of PEF are reduced in diseases causing airways obstruction. Peak flow monitoring is particularly useful for following trends in lung function, quantifying response to treatment and identifying trigger factors.

Portable peak flow meters are a reasonably reliable tool for patients to monitor their own airway function

Recently several small, inexpensive yet accurate battery-powered devices for measuring ventilatory function (including FEV1) have been developed, some of which can store the test data which can be downloaded onto a computer for review and statistical analysis.

National Asthma Council Australia.,(2007)

STEPS IN USE OF PEAK FLOW METER

A peak flow meter is simple to use. Even children ages 4 and up are able to perform a PEF and $FEV_1$with good results. To measure a peak expiratory flow and FEV_1:

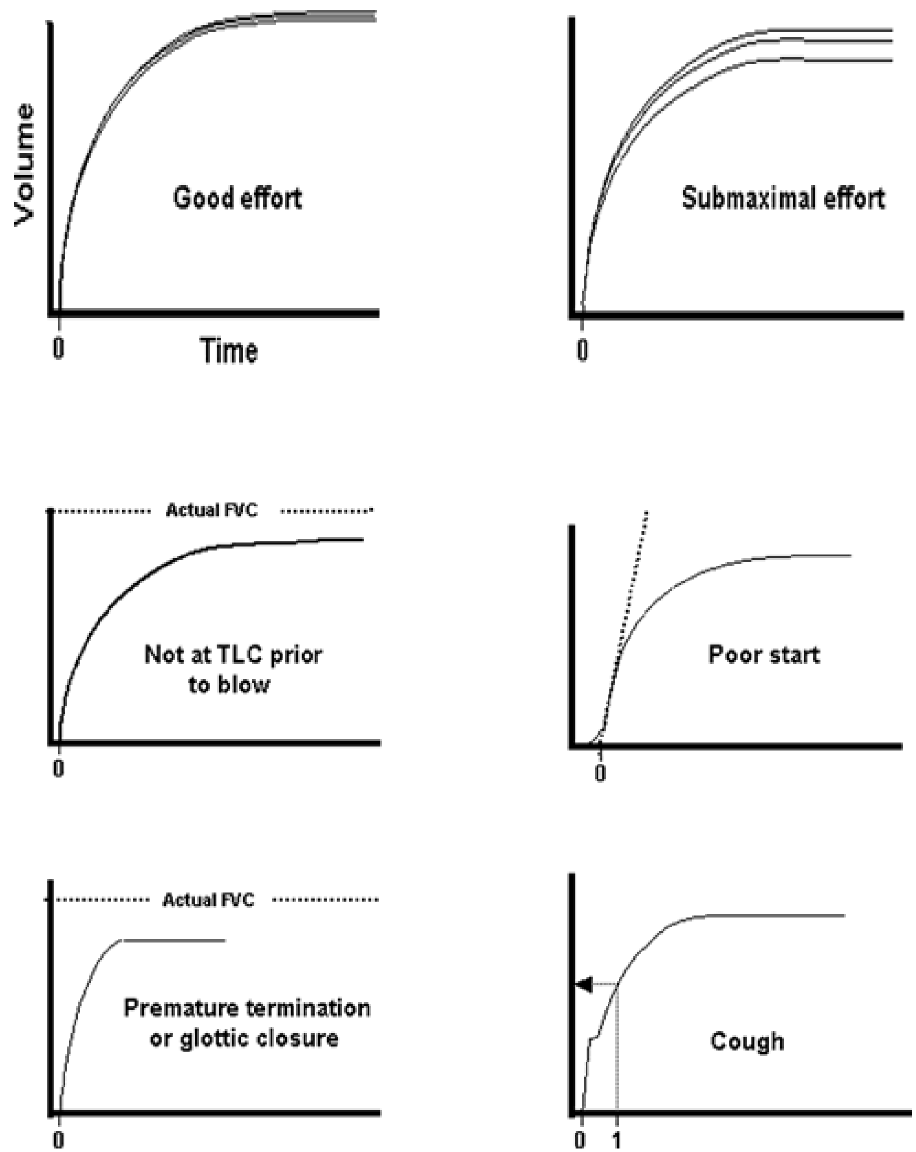
- Stand up straight.
- Take a deep breath filling the lungs completely.

- Place the mouthpiece in child's mouth; lightly bite with teeth, and close the lips on it.
- Blast the air out as hard and as fast as possible in a single blow.
- Record the number that appears on the meter.
- Record the highest of the three readings of peak flow rate and FEV_1 in a diary.

American lung association., (2007)

ACCEPTABILITY CRITERIA

- The patient followed instructions
- A continuous maximal expiratory manoeuvre throughout the test (i.e. no stops and starts) was achieved and was initiated from full inspiration
- There was no evidence of hesitation during the test
- The test was performed with a rapid start
- The PEF has a sharp rise (flow-volume)
- No premature termination, i.e. expiration continued until there was no change in volume and the patient had blown for ≥3 seconds (children aged <10 years) or for ≥6 seconds (patients aged ≥10 years). However, the patient or practitioner can terminate the blow if the patient cannot or should not continue
- There were no leaks
- No cough (note FEV1 may be valid if cough occurs after the first second)
- No glottis closure (Valsalva)
- No obstruction of the mouthpiece (e.g. by the tongue or teeth)
- No evidence that the patient took an additional breath during the expiratory manoeuvre.


Volume
Good effort
0
Time
Submaximal effort
0
Actual FVC
Not at TLC prior
to blow
0
Poor start
0
Actual FVC
Premature termination
or glottic closure
0
Cough
0
1

Peter Roger.,(2009)

PREDICTED NORMAL VALUES

To interpret ventilatory function tests in any individual, compare the results with reference values obtained from a well-defined population of normal subjects matched for sex, age, height and ethnic origin and using similar test protocols; and carefully calibrated and validated instruments.

Normal predicted values for ventilatory function generally vary as follows:

- **Sex:** For a given height and age, males have a larger FEV1, FVC, $FEF_{25-75\%}$ and PEF, but a slightly lower FEV1/FVC.
- **Age:** FEV1, FVC, FEF25-75% and PEF increase, while FEV1/FVC decreases, with age until about 20 years old in females and 25 years in males. After this, all indices gradually fall, although the precise rate of decline is probably masked due to the complex interrelationship between age and height. The fall in FEV1/FVC with age in adults is due to the greater decline in FEV1 than FVC.
- **Height:** All indices other than FEV1/FVC increase with standing height.
- **Ethnic Origin:** Caucasians have the largest FEV1 and FVC and, of the various ethnic groups, Polynesians are among the lowest. The values for black Africans are 10-15% lower than for Caucasians of similar age, sex and height because for a given standing height their thorax is shorter; normal values for Indigenous Australians may be even lower. Chinese have been found to have an FVC about 20% lower and Indians about 10% lower than matched Caucasians.

For the children up to 12 years the standard predicted values for boys and girls according to their age can be adopted from Polgar scale

National Asthma Campaign., (2010)

INTERPRETATION OF VENTILATORY FUNCTION TESTS

The presence of ventilatory abnormality can be inferred if any of FEV1, VC, PEF or FEV1/FVC is outside the normal range.

CLASSIFYING ABNORMAL VENTILATORY FUNCTION

CLASSIFICATION OF LUNG DISORDERS	PATHOLOGY	ABNORMAL PARAMETERS
Obstructive disorders	Causes decrease in the rate of airflow, increased residual volume due to air trapping	FEV_1 decreased FVC decreased PEF decreased
Restrictive lung disorders	Decrease in the volume of the lungs especially inspiratory capacity and vital capacity	FEV decreased FVC decreased PEF normal or decreased

David P., (2008)

INFECTION CONTROL MEASURES

During procedure patients can generate flows up to 14 L/sec (840 L/min) which can easily mobilise saliva and create dense macro- and micro-aerosols by entrainment of the fluid lining the mucous membranes. These can then be deposited in the equipment. Unless such deposition is prevented or the equipment is rigorously cleaned and decontaminated, the chance of cross-infection exists.

Mouthpieces must be disposed of or cleaned and disinfected between patients because the greatest danger of cross-infection is via direct contact with bodily fluids.

Since it is usually impractical to effectively decontaminate the interior surfaces of a mouth pieces between patients, most lung function laboratories clean and disinfect their equipment periodically (weekly or monthly) or use a disposable. If disassembling the device for cleaning, it is essential to:

- Thoroughly dry the components before reassembling check the device for correct operation
- Adjust the calibration, if necessary.

Johns D.P., (2009)

3. OVER VIEW OF BREATHING EXERCISES AS PLAY WAY METHOD

INTRODUCTION

Many people benefit from doing regular breathing exercises. Children with respiratory infections use them to clear secretions from their lungs. Musicians, who play wind or brass instruments, as well as asthmatics, may incorporate breathing exercises to increase respiratory control. Some people just use breathing exercises as relaxation techniques. Turn these exercises into games and fun activities to make them more enjoyable, for the younger children

Dr.Andrew Veil.,(2007)

THE AIMS OF BREATHING GAMES

- The two aims of the ‘breathing games’ are to encourage child to take bigger, deeper breaths and to learn how to breathe out in different ways.
- This will help to move and clear secretions from their lungs and increase ventilation.
- Eventually, the child will learn how to huff and cough and learn the difference between shallow, deep, fast and slow breaths.
- This awareness of their breathing will help them to perform more formal breathing techniques to clear their lungs, which are taught by the physiotherapist when they are old enough to understand
- To teach relaxation.
- To teach breathing control.
- To teach postural awareness.
- To mobilize thorax and shoulder girdle.

William Radcliss.,(2012)

INDICATIONS FOR BREATHING EXERCISES

1. Acute or chronic lung disease.
    - Chronic obstructive lung disease.
    - Pneumonia.
    - Atelectasis.
    - Pulmonary embolism.

- o Acute respiratory distress.

2. Pain in the thoracic or abdominal area because of surgery or trauma.
3. Airway obstruction secondary to bronchospasm or retained secretions and wheezing.
4. Deficit in the central nervous system that lead to muscle weakness.
   - o Acute, chronic, or progressive myopathic or neuropathy diseases.
5. Severe orthopedic abnormalities, such as scoliosis and kyphosis, that affects respiratory function.
6. Stress management and relaxation procedures
7. Infections of the lower airway like acute and chronic bronchitis, Bronchiolitis.

Arnold Jessica., (2012)

PRECAUTIONS

- Never allow a patient to force expiration. Expiration should be relaxed and passive. Forced expiration only increases turbulence in the airways, which can lead to bronchospasm and increased airway restriction.
- Do not allow a patient to take a very prolonged expiration. This causes the patient to gasp with the next inspiration. The patient's breathing pattern then becomes irregular and inefficient.
- Do not allow the patient to initiate inspiration with the accessory muscles and the upper chest. Advise the patient that the upper chest should be relatively quiet during breathing.
- Allow the patient to practice deep breathing for only three or four inspirations and expirations at a time to avoid hyperventilation

Tania Kate (2010)

MAKING IT FUN FOR CHILDREN

Children will be more motivated to learn, practice, and implement deep breathing if it is fun.

BENEFITS OF BREATHING EXERCISES

- Slows the breathing down
- Keeps airways open longer so the lungs can get rid of more stale, trapped air
- Reduces the work of breathing
- Increases the amount of time for exercise or perform an activity
- Improves the exchange of oxygen and carbon dioxide

Medscape., (2012)

BLOWING BUBBLES

To make it effective the child should take a big breath in and then gently blow out through an 'O' shaped mouth of a bubble wand. Repeat 10 'blows'. As their technique improves, encourage child to breathe out for longer and more fully.

Strategy to perform

- Find a quite comfortable place. Stand or sit in a position that keeps the back straight.
- Take a deep breath focusing only on breathing. Feel the air comes into the lungs.
- Gently blow through the 'o' shaped mouth of a bubble wand dipped in its solution to produce bubbles.
- Do this at least for 5 minutes for getting into a relaxed state.
- Try for several breaths. To make breathing as slow
- Continue to focus on breathing; try to exhale completely pushing all the air out of the lungs.
- Inhale very slowly and fill the lungs back with fresh air.

James Highland., (2012)

BLOWING COTTON WOOL BALLS

Place a cotton wool ball on open, flat palm and ask child to take a big breath in and then blow the ball off the hand.

Strategy to perform

- Sit in a comfortable position with spine straight.
- With mouth gently closed, breathe in as fast as possible.
- Blow over the cotton balls on the palm, to blow it to a maximum distance the child can.
- While doing this exercise the child should feel effort at the base of the neck, chest and abdomen. The muscles in this area will increase in strength the more this technique is practiced.
- Repeat several times at least for five minutes.

James Highland., (2012)

BLOW BOTTLE EXERCISE

Blow bottle exercises improve the pulmonary function. Bottle blowing helps to reduce symptoms of respiratory distress thereby reducing hospital stay for children.

Strategy to perform

- Take two bottles two litre and one litre respectively.

- Fill the first bottle with 80% of water and keep second bottle empty. Use attractive colours to the water by adding food colours.
- Close the bottles air tight and connect them with rubber tubing of 10mm diameter.
- Place one inlet tubing in first bottle to blow through, to facilitate maximum escape of fluid to the second bottle within one breath.
- Repeat for 5 minutes.

Bárány M, Holmberg H., (1997)

PURSED LIP BREATHING

Pursed lip breathing is the simplest way to control shortness of breath. It provides a quick and easy way to slow pace of breathing making each breath more effective.

Strategy to perform

- Relax the neck and shoulder muscles.
- Breathe in slowly through the nose for two counts. Keeping the mouth closed. It may help to count inhale one and two.
- Pucks or purse the lips as gently as to flicker the flame of a candle
- Breathe out slowly and gently through pursed lips while counting four.
- Repeat for 5 minutes.

Linda Ray (2013)

BLOWING BALLOON

Blowing balloons work out on the intercostals muscles responsible for spreading and elevating the diaphragm and rib cage. This allows lungs to absorb oxygen alter its chemical composition and exhale carbon dioxide as exhaling commenced.

Strategy to Perform

- Obtain a party balloon; loosen the balloon by stretching it in all directions.
- Grasp the end of the balloon ¼ inch below the lip of the opening between the index finger and thumb.
- Take a deep breath and seal the lips around the balloon.
- Blow the maximum of the air from the lungs into the balloon.
- Repeat for 5 minutes.

Dr. Andrew Weil., (2007)

Dr. Andrew Weil., (2007)

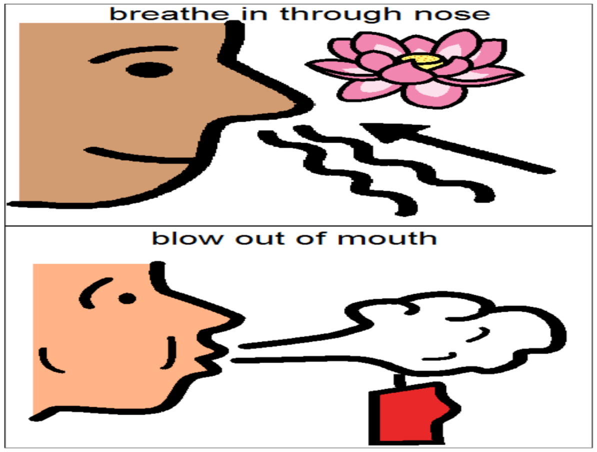
CANDLE AND FLOWER

This technique helps to deliver oxygen and also helps to eliminate waste in the body and helps maintaining the healthy cells.

Strategy to perform

- Gather together a lighted candle and flower
- Starting with the flower, have the child to take a deep breath (remind them slow and deep) through their nose as if they are smelling a flower.

- Instruct them to hold the breath for 2 seconds.
- Then release the breath slowly to blow off the candle.
- Repeat for 5 minutes.



Rick Rockwell (2013)

SECTION A: STUDIES RELATED TO PREVALENCE AND RISK FACTORS OF LOWER RESPIRATORY TRACT INFECTIONS AMONG CHILDREN

Suguna E, Kumar S G., (2014) conducted cross sectional study aimed to assess the prevalence and certain risk factors associated with ARI among school children. The study was conducted among 397 school children age group of 5-14 years in the seven schools of rural Puducherry. Data was collected by interview using pre-tested structured questionnaire and analyzed by univariate and multiple logistic regression analysis. Overall, 51.1% (203) of the subjects had at least one symptom of ARI in the preceding 2 weeks. The manifestations of ARI included allergic rhinitis (183, 46.1%), dry cough (75, 18.9%), throat pain and fever (54, 13.6%), wheezing (39, 9.8%) and ear discharge (28, 7.1%). About half of the subjects with ARI (52.2%) belonged to 5-9 year age group and females (52.3%). Mother's education, family history of allergic disorder and asthma, absence of smoke outlet in kitchen and windows in sleeping room were found to be significantly associated with ARI in univariate analysis ($P < 0.05$). Multiple logistic regression analysis showed that 5-9 years age group (OR = 1.7), family history of allergic disorder (OR = 9.6) and asthma (OR = 5.2), presence of smoke outlet in kitchen (OR = 0.5), absence of windows in sleeping room (OR = 3.0) were found to have an independent association with the ARI.

PrzemkoKwinta, GrzegorzLis., (2012) Performed a prospective community-based study to assess the prevalence and risk factors of acute respiratory infections in an open cohort of 288 children aged 0–12 years in the town of Sisimiut, Greenland, children were monitored weekly, and episodes of upper and lower respiratory tract infections were registered. The cohort had respiratory symptoms on 41.6% and fever on 4.9% of surveyed days. The incidence of lower respiratory tract infections was 0.9 episodes per 100 days at risk. Up to 65% of the episodes of ARI caused activity restriction; 40% led to contact with the health center. Risk factor analyses were carried out using a multivariate Poisson regression model adjusted for age. Risk factors for upper respiratory tract infections included attending a child-care center (relative risk = 1.7) and sharing a bedroom with adults (relative risk = 2.5 for one adult). Risk factors for lower respiratory tract infections included being a boy (relative risk [RR] = 1.5), attending a child-care center (RR= 3.3), exposure to passive smoking (RR = 2.1), and sharing a bedroom with children aged 0–5 years (RR = 2.0 for two other children). Breastfeeding tended to be protective for lower respiratory tract disorders.

McClure.L., (2012) conducted a study to know the prevalence of asthmatic bronchitis of children, by use of peak flow meter in Central America. 12,245 urban children with persistent asthma were enrolled in a school-based study. Self-monitoring of symptoms or peak flow monitoring (PFM) is recommended for all patients. The mean age of the children was 10.0 (SD 2.1) years; 57% were male and 91% were African American. 98% (n = 11,974). The prevalence of reported wheezing symptoms varied across PFM readings; the highest prevalence occurred in the setting of red zone readings, with intermediate prevalence in the setting of yellow zone readings, and lowest prevalence in the setting of green zone readings.

Pereira.L.M.et.al., (2010) conducted study on, Health burden of asthmatic bronchitis and allergic rhinitis in children attending clinics in selected public sector health clinic, Trinidad. Children (393) were between 2-17 years and included 239 (60.8%) boys and 154 (39.2%) girls. As many as 53.9% of children sampled 95% suffered from acute respiratory infections (ARI). Children exposed to household smoking were nearly twice as likely to have ARI ($p<0.0041$, OR=1.9, CI 1.22-2.88). More children with ARI (>60%) suffer day and night symptoms ($p<0.001$), and miss school (59.8%) ($p<0.03$) at least once a week ($p<0.002$) than asthmatics without ARI (OR=1.5, 95% CI=1.03-2.30).

Pradeep.M.J.et.al., (2010) conducted a prospective case control study to identify the risk factors of acute respiratory tract infection among 208 children aged 5 to 10 years in Cheluvambu government medical college hospital, Mysore There were three episodes of mild, moderate, or severe ARI per child per year, including 1.3 pneumonia episodes per child per year. The peak of infection corresponded to the rainy season (July-November), and a smaller peak to the dry season (February-April). Pre designed profoma was used to assess the risk factors involved in the subjects. Chi square test was used for statistical analysis were p value <0.05 was taken as significant. Logistic regression method was used by SPSS package for data analysis. The study result shows that inappropriate immunization for age (21.2%vs 7.69%), families having more than two under five children at home (30.1 vs 11.4) and overcrowding (91.3 vs 20.19) are highly associated with respiratory tract infection.

Kuppusamy K., (2010) conducted a community based cross sectional study to determine the prevalence of ARI and its risk factors among children in urban and rural areas of Kancheepuram district, South India, during the period of October 2009-February 2010, covering a study population of 500 children. Descriptive statistics was done and chi-square was used as test of significance. Overall, prevalence of ARI was found to be 27%. ARI was noticed more among low social class (79.3%), illiterate mothers (37.8%), those living in kutcha houses (52.6%), overcrowded houses (63.7%), use of smoky fuel for cooking (67.4%), inadequate cross ventilation (70.4%), history of parental smoking (55.6%), low birth weight children (54.8%), and malnourished children (57.8%). Rural children (62.2%) were more affected than urban children.

Ranabir., (2009) conducted a study to assess the prevalence rate of wheezing among Indian children. The statistical analysis was done by mean and median.15 epidemiological studies are identified on the development of wheezing in Indian children from 300 relevant articles. The study results revealed that, the mean prevalence was 7.24±SD5.42. The median prevalence was 4.75% (with IQR=2.65-12.35%). Overall weighed prevalence was found to be 2.74. Childhood wheezing among children 6-14 years of age was lower than the younger children (<6 years of age). Urban and male predominance with wide inter- regional variation in prevalence was observed.

SECTION B: STUDIES RELATED TO BREATHING EXERCISES ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS

Shashikala.L et.al., (2011) conducted a study to know the effect of breathing exercises in the form of play activities on pulmonary function tests among the children in the age group of 5- 12 years. The test group consist of children hospitalized with respiratory infections like pneumonia, bronchitis etc. The pulmonary function tests were conducted by using Medspire. First phase of recording were done before starting the exercise training. The peak expiratory flow rate (150±0.7) and forced expiratory volume (1.54±0.34) were recorded. Second phase of recording was done after the exercise training for a week. Results showed a significant increase in the values of PEFR (180±0.06) and FEV_1 (2.11±0.70) in the second phase of reading.

Bianchi.et.al., (2011) conducted a study to evaluate the effects of a respiratory exercise program tailored for children with wheezing in Brazil. 14 patients concluded the 16-week respiratory exercise program. All the patients were evaluated with regard to lung function, respiratory muscle strength, aerobic capacity, quality of life and clinical presentation. Descriptive analysis was done. Considerable improvement in quality of life was observed. During the study period, a significant difference was observed in the percentage of days when the patients recorded coughing ($p = 0.02$), shortness of breath ($p = 0.03$), night waking due to shortness of breath, and the use of bronchodilating agents (p=0.04). After 16 weeks of open-trial intervention, significant increases in maximum inspiratory pressure (27.6%) and maximum expiratory pressure (20.54%,) were demonstrated.

Sakshi, Multani (2010) Studied the effects of breathing exercise on lung volumes of children in Patiala. The sample size of 40 subjects with wheezing was enrolled in the study. The subjects were divided in two groups of twenty each. One group was given breathing exercise intervention by the means of deep breathing, paper strip blowing and balloon blowing, cotton ball blowing and bottle blowing. Before and after the intervention period, the child was investigated with spirometeric analysis to find out the changes in the lung volumes. The exercises interventions were administrated for 1 week period. Paired t-test was used to examine the changes in dependent variables from base-line. Unpaired t-test was used to compare and analyze the changes between the groups. The calculated t value for PEF ('t'= 2.09) and FEV_1 ('t'=3.04) is more than the t critical value which is1.729 ($p<0.10$). This indicates that the differences between the scores obtained from the pre and post value which is highly significant indicating that there was improvement in lung function. The calculated t value between the two groups came out to be PEF ('t'= 2.66), FEV_1 ('t'=3.40) and its critical value is 1.63 ($p<0.10$). The overall improvement of lung function was significantly more in breathing exercise interventions than control group

Dasmen., (2010) conducted an interventional study of few-minute breathing exercise program as a treatment modality for respiratory infections and to evaluate its efficacy in improving quality of life among children in Kuwait. Non-Randomized study design was used. Clinical assessment includes physical exam, asthma control/quality of life questionnaires, pulmonary function tests, and lung inflammation test. About 200 children with wheezing associated infections are divided to intervention group and control group. The intervention group received standard care along with breathing/mild physical exercise. The control group had no exercise intervention. The study results revealed that the respiratory parameters PEF and FVC are significantly increased in post test compared to the pre test scores (PEF 102±14.92 to 167±16.02 and FVC 1.01±0.48 to 1.67±0.52). 86% of the participants in experimental group had good quality of life and good lung function after the intervention.

Sodhi C., Singh S. and Dandona P.K., (2009), done a research on "A Study of the Effect of breathing exercise on Pulmonary Functions in children with respiratory infections". The role of breathing exercises, as an adjunct treatment is well recognized. One hundred twenty children (6-14 years) of respiratory infections were randomized into two groups i.e., Group A (breathing exercise group) and Group B (control group). Each group included sixty patients. Pulmonary function tests were performed on all the patients at baseline, after 2 weeks. Majority of the subjects in the two groups had mild disease (34 patients in Group A and 32 in Group B). Group A subjects showed a statistically significant increasing trend ($P < 0.01$) in peak expiratory flow rate ('t value =16.4), forced expiratory volume in the first second ('t' value=15.6), at 2 weeks as compared to Group B. Thus, breathing exercises used adjunctively with standard pharmacological treatment significantly improves pulmonary functions in children with respiratory infections.

Pneumol.B.J., (2008) conducted study on, Inspiratory muscle training(IMT) and respiratory exercises in children with respiratory infections in Portuguese. A randomized analytical study involving 50 children with pneumonia and bronchitis allocated to one of two groups: an IMT group, comprising 25 children submitted to IMT via an education and treatment program; and a control group, comprising 25 children who were submitted only to monthly medical visits and education. The results were evaluated using analysis of variance, the chi-square test and Fisher's exact test, values of $p > 0.05$ being considered significant. In the comparative analysis, pre- and post-intervention values of maximal inspiratory pressure (48.32±5.7 to 109.92±18), maximal expiratory pressure (50.64±6.55 to 82.04±17.0) PEF (173.6±15.817 to 312±16.48) increased significantly in the IMT group: ($p < 0.0001$). In the control group, however, there were no significant differences between the two time points.

Michail.S., (2007) conducted a study to assess effectiveness of breathing exercises among children(8-14 years) in Russian hospital. 70 Children with severe wheezing were participated in the study. The exercises were taught for the children and observations were performed for 2 months. 6 Lessons once a week with 1.5 hours duration was given. Results were evaluated by spirometry and symptoms dynamic. Average pre test value of Forced Vital Capacity is 89%, Forced Expiratory Volume is 81% and Average post test value of FVC is 100%, FEV is 95%. There was reduction in number of attacks, reduction of cough and improve nasal breathing.

Lindmark., (2005) conducted a prospective randomized study to investigate the effects of deep-breathing exercises on pulmonary function, atelectasis, and arterial blood gas levels among children in Sweden. The experimental group performing deep-breathing exercises (n = 48) were compared to a control group (n = 42) who performed no breathing exercises. Post test by spirometric measurements, spiral CT arterial blood gas analysis, were performed on the fourth day. Compared to the control subjects, the patients in the deep-breathing group had a significantly smaller reduction in FVC (to 71 ± 12%, vs 64 ± 13% of the values; p = 0.01) and FEV_1 (to 71 ± 11%, vs 65 ± 13% of the values; p = 0.01). 72% of the patients experienced a subjective benefit from the exercises.

Niedziocha., (2005) conducted a study to evaluate the effect of abdominal breathing exercises on individuals with respiratory infections and wheezing, at Mater Hospital in Brisbane. 489 Participants were split into two groups, one group did the abdominal breathing exercises and the other group did not do so. Both groups were instructed to use their medication. Over a three-month period, bronchodilator use for the exercisers decreased by 90%, inhaled steroid use decreased by 49%, wheezing symptoms decreased by 71% and quality of life improved by 54%. This compared with the non-exercisers whose bronchodilator use increased by 9 percent and inhaled steroid use did not change.

SECTION C: STUDIES RELATED TO NURSES ROLE IN PREVENTION OF LOWER RESPIRATORY TRACT INFECTIONS AMONG CHILDREN

Vandana Chauhan et.al., (20012) a quasi-experimental study was conducted to assess the predisposing factors of LRTI, effectiveness of teaching programme on the recovery of children and on the practice of their caregivers. This study was conducted in a child nursing home at district Haridwar, Uttarakhand. Total 51 children and their caregivers who met the selection criteria were selected by convenient sampling technique. Pre test was taken by using structured questionnaire, practice checklist and rating scale followed by LRTI preventive education programme. After five days post test was taken. The mean post test practice score (9.8±1.27) was higher than the mean pre test practice score (5.8±1.43) and 't' value was 15.3. The mean post test assessment score (22.01±1.03) was higher than the mean pre test assessment score (16.03± 1.43) and 't' value was 24.9. The difference between pre test practice score and post test practice score was 4 and between pre test assessment score and post test assessment score was 5.98. It means practice and assessment score improved after implementation of education programme. The finding of the study reveals that the education had a vital role in improving the practice of caregivers and recovery of the children

Nihon Kokyūki Gakkai asshi et.al., (2011) conducted a study on Effects of pulmonary rehabilitation in children with respiratory infections. Block experimental design was used. 37 children were randomly selected and pulmonary rehabilitation was evaluated for a mean period of 3 weeks. The rehabilitation program consisted of relaxation, breathing exercise training, respiratory muscle training and instruction. Significant improvement was shown in vital capacity (n = 37) on average from 1.48 l to 1.59 l, in FEV_1 (n= 37) from 0.93 to 1.02, in PaO2 (n = 35) from 67.1 to 72.4, in activity (n = 23) from 19.6 points to 22.5 points, in dyspnea (n = 22) from 18.4 points to 22.5 points and in quality of life (n = 25) from 39.0 points to 44.2 point.

Nick.A Francis., (2011) conducted study to establish whether an interactive booklet on respiratory tract infections in children reduces re consultation for the same illness episode, reduces antibiotic use, and affects future consulting intentions, while maintaining parental satisfaction with care. Pragmatic cluster randomised controlled trial was used. 61 general practices in Wales and England. Participants 558 children (6 months to 14 years) presenting to primary care with an acute respiratory tract infection (7 days or less). Nurses in the intervention group were trained in the use of an interactive booklet on respiratory tract infections and asked to use the booklet during nursing care with recruited patients. Nurses in the control group conducted their care as usual. The proportion of children who attended a face-to-face consultation about the same illness during the two week follow-up period was assessed. Re consultation occurred in 12.9% of children in the intervention group and 16.2% in the control group (absolute risk reduction 3.3%, 95% confidence interval −2.7% to 9.3%, P=0.29). Using multilevel modelling to account for clustering, no significant difference in re consulting was noted (odds ratio 0.75; 0.41 to 1.38). Antibiotics were prescribed at the index consultation to 19.5% of children in the intervention group and 40.8% of children in the control group (absolute risk reduction 21.3%, 95% confidence interval 13.7 to 28.9), P<0.001). A significant difference was still present after adjusting for clustering (odds ratio 0.29;0.14to0.60).There was also a significant difference in the proportion of parents who said they would consult in the future if their child developed a similar illness(odds ratio 0.34; 0.20 to 0.57). Satisfaction, reassurance, and parental enablement scores were not significantly different between the two groups.

Rupert., (2010) conducted a study to ascertain the role and confidence levels of the practice nurse in diagnosis and management of children with respiratory infections in west Bengal. Data was collected by assessing the practice of nurses in management, extent of services and confidence level of nurse in this role. 64 respondents are participated in the study. Dedicated clinics operated in 47% of practices, 87% undertaken by the nurse alone. Responsibilities undertaken by nurse alone included: instruction of inhaler technique 93%, supervising self-management plans 87%, changing medication dosage 71%, and withdrawing treatment 53%, diagnosing infectious diseases 45% and managing complications 29%. Nurses initiated treatment alone, without consulting a doctor, as follows; inhaled bronchodilators 55%, long acting bronchodilator 54%, inhaled steroids 56%, oral steroids 15%, anti-leukotrienes 5% and theophyllines 3%. The confidence level of the nurses performing these tasks was high. Formal training had been undertaken by 74% of respondents. There were statistically significant associations between performance of organizational tasks and training.

Hans Holmberg., (2008) conducted a study to determine whether bottle blowing has any positive effect in children with pneumonia. In a prospective open study 145 children with pneumonia requiring hospitalization were randomized to early mobilization (Group A) to sit up and take 20 deep breaths on 10 occasions daily (Group B) or to sit up and to blow bubbles in a bottle containing 10 cm of water through a plastic tube on 10 occasions daily (Group C). Peak expiratory flow, vital capacity, forced expiratory volume in 1 second were determined on admission and on the day 4. Fever duration and hospital stay were recorded. The patients in the Group A were hospitalized for a mean of 5.3 days, Group B 4.6 days and Group C for 3.9 days. Treatment was a significant factor ($p=0.037$) in Cox regression model, with group C significantly better than group A ($p=0.01$). The number of days with fever was 2.3, 1.7, and 1.6 in group A, B and C respectively. These differences were not significant ($p=0.28$). Significant differences were found between groups regarding PEF, VC and FEV_1. Intensive bottle blowing shortens the hospital stay in patients with pneumonia. The underlying Mechanism is not clear.

CHAPTER III

METHODOLOGY

RESEARCH METHODOLOGY

This chapter deals with the methodology adopted for the study. It includes research approach, research design, and setting, criteria for sample selection, sample and sampling technique, instrument, method of data collection, pilot study, Plan for data analysis and protection of human subjects.

RESEARCH APPROACH

An evaluative approach was used to evaluate the effectiveness of breathing exercises as play way method on respiratory parameters among children with Lower respiratory tract infections.

RESEARCH DESIGN

The research design selected for this study was Quasi experimental non equivalent control group pre test and post test design.

SCHEMATIC PRESENTATION

GROUP	PRE TEST	INTERVENTION	POST TEST
Experimental group	O1	X	O2
Control group	O1	-	O2

The symbols used are

O1 - Pre test to assess the level of respiratory parameters in experimental group and control group

X - The intervention breathing exercises as play way method for 30 minutes in the morning and evening in experimental group

O2 - Post test to assess the level of respiratory parameters in experimental group and control group.

SETTING FOR THE STUDY

The study was conducted in Masonic hospital and child trust hospital at Coimbatore. Masonic hospital is situated in Race course road, Coimbatore. It is a 100 bedded Pediatric hospital with four floors. The hospital has well equipped pediatric intensive care unit. Monthly out patient census is about 3000-3500 in patient census is 500-600.Nearly 75- 90 children were admitted with lower respiratory tract infections. About 70 to 85 children are in the age group of 5-12 years.

Child Trust Hospital is 53 bedded well equipped hospital with intensive care facility situated in Nanjappa Nagar, Trichy Road, Coimbatore. Monthly outpatient census is about 2500- 3500, inpatient census for lower respiratory infections are about 80- 90. Among them 50- 60 children are in the age group of 5-12 years.

POPULATION

The population selected for this study was children with lower respiratory tract infections.

SAMPLE

Sample consists of children who are diagnosed as acute and chronic bronchitis, asthmatic bronchitis (wheezing), bronchiolitis and pneumonia admitted in pediatric wards of selected hospitals, Coimbatore.

CRITERIA FOR SAMPLE SELECTION

Inclusion criteria

- Children, who can able to understand and speak Tamil.
- Children between the age group of 5-12 years
- Both male and female children
- Children, who are able to do activity
- Children, who are willing to participate
- Children who were admitted in the inpatient department for a minimum stay of 5 days.

Exclusion criteria

- Children, who are very sick
- Children, with physical disabilities such as blindness, deaf, dumb and special children (MR).

SAMPLE SIZE

Sample size composed of 60 children with lower respiratory tract infections. Among 60 samples, 30 were in experimental group and 30 were in control group

SAMPLING TECHNIQUE

The samples were selected by using convenient sampling technique. The 30 samples selected from the Child Trust Hospital were allotted to control group and the 30 samples from the Masonic hospital were allotted to experimental group.

METHOD OF DATA COLLECTION

DESCRIPTION OF THE TOOL

Tool consists of two parts

PART-I

It deals with demographic variables such as age, sex, education, residence, religion, pet animals in house, type of allergy, Duration of breast feeding, frequency of attack in last year and duration of illness.

PART- II

It deals with respiratory parameters which consist of two parts

SECTION 1:- PEAK EXPIRATORY FLOW RATE

Peak expiratory flow rate is measured in liters per minute as per the colour zones by using micro life digital peak flow meter. The scoring is given in percentage. It is calculated by using the following equation

$$\text{PEFR\%} = \frac{\text{Personal peak flow rate}}{\text{Predicted peak flow rate}} \times 100$$

The standard predicted values for PEFR according to the age for boys and girls are adopted from Polgar G, Weng T.R; The functional development of respiratory system.

Asthma Management Handbook.,(2013)

SECTION II: FORCED EXPIRATORY VOLUME IN ONE SECOND

Forced expiratory volume is measured in liters. It is measured by using a micro life digital peak flow meter. The score is given in percentage. It is calculated by using the following equation,

$$\text{FEV1\%} = \frac{\text{Personal FEV1}}{\text{Predicted FEV1}} \times 100$$

The standard predicted values of FEV_1 for boys and girls according to age are adopted from Polgar G, Weng T.R The functional development of respiratory system.

Asthma Management Handbook.,(2013)

SCORING PROCEDURE AND INTERPRETATION

SECTION I

Peak expiratory flow rate is measured in liters per minute as per the colour zones by using micro life digital peak flow meter. The scoring is given in percentage. The scoring for peak flow rate is interpreted as follows.

Peak flow zone	**Percentage (%)**	**Description**
Green zone	90 to 100	Normal
High yellow zone	70 to 89	Mild
Low yellow zone	50 to 69	Moderate
Red zone	Less than 50	Severe

[Adapted from Johns Hopkins Medicine (2010)]

SECTION II

Forced expiratory volume is measured in liters. It is measured by using a micro life digital peak flow meter. The score is given in percentage. The scoring of forced expiratory volume is interpreted as follows.

FEV_1 Parameter	**Percentage (%)**	**Description**
FEV1	80 to 100	Normal
	70 to 79	Mild

	60 to 69	Moderate
	Less than 60	Severe

(**Adapted from The worker's Health Protection Program {2013}**)

VALIDITY

The validity of the tool was established in consultation with four experts in the field of pediatric nursing and one medical expert. The instrument used was validated for its accuracy with the digital spirometer at Kovai Respiratory Research Center by Karl Pearson's formula Peak flow rate (r =0.9) and forced expiratory volume(r= 0.94).

RELIABILITY

The reliability of the tool was established by using inter rater method (Karl-Pearson formula). The value was found to be reliable, for Peak flow rate (r=0.93), and for forced expiratory volume (r=0.91)

PILOT STUDY

The pilot study was conducted in selected hospitals Coimbatore, for a period of 10 days. The researcher obtained permission from the institutions and from the participants prior to the study. The samples who fulfill the inclusion criteria were selected. The convenient sampling technique was used to select 6 samples for experimental group from Masonic Hospital and 6 samples for control group from Child Trust Hospital. Demographic variables and pre test was conducted on the first day for both experimental and control group for half an hour. In experimental group, the intervention of breathing exercise was taught to the children and made them to do the exercises daily for 30 minutes under supervision of the researcher; each exercise was performed for 5 minutes with equal intervals in the morning and evening for 5 consecutive days. In control group, the existing hospital routine was practiced. After 10 th session on 5th day post test was done to assess peak flow rate and forced expiratory volume measured by using micro life digital peak flow meter in both experimental and control group.

The paired‘t’ value for experimental group, Peak flow rate ‘t’= 4.8 (table value= 2.571) and forced expiratory volume ‘t’= 3.90 (table value= 2.571) is significant at P< 0.05 level which revealed that in experimental group there is a significant improvement in peak flow rate and forced expiratory volume. Independent “t” test calculated value Peak flow rate 0.214 (table value= 2.228) which is not significant and forced expiratory volume 13.2 (table value= 2.228) which is significant at P< 0.05 level of significance revealed that there is a significant difference in forced expiratory volume between experimental and control group. After the pilot study the researcher found that it is feasible and practicable to conduct the main study.

DATA COLLECTION PROCEDURE

Data collection was done in selected hospitals at Coimbatore, for a period of 5 weeks. The investigator has obtained written permission from the hospital management and oral consent was obtained from the samples prior to the study. The purpose of the study was explained to the subjects. The samples who fulfilled the inclusion criteria were selected. The convenient sampling technique was used to select 30 samples for control group, from the Child Trust Hospital and 30 samples for experimental group from Masonic Hospital. Everyday 3-4 samples were selected. Demographic variables and pre test was conducted for half an hour on the first day for both experimental and control group. In experimental group, the intervention of breathing exercise as play way methods like blowing bubbles; blowing cotton wool balls; blow bottle exercise; pursed lip breathing; blowing balloon and candle and flower were taught to the child and made them to do the exercises daily for 30 minutes in the morning and evening for 5 consecutive days. Each exercise was performed for 5 minutes with equal intervals. Child was supervised by the investigator in every session. In control group, the existing hospital routine was practiced. On the 5th day after the completion of 10 sessions post test was done to assess the respiratory parameters measured by using a micro life digital peak flow meter in both experimental and control group. The data collected was analyzed by using descriptive and inferential statistics.

PLAN FOR DATA ANALYSIS

The collected data were analyzed by using descriptive and inferential statistics. The statistical methods were used are as follows,

Sl. No	Data analysis	Method	Objectives
1	Descriptive statistics	Frequency, Percentage Mean Standard deviation	To describe about demographic variables of children with lower respiratory tract infections To assess pre test and post test scores of respiratory parameters among children with lower respiratory tract infections in experimental group. To assess pre test and post test scores of respiratory parameters among children with lower respiratory tract infections in control group
2.	Inferential statistics	Paired' test Independent 't' test Chi-square	Compare the pre test and post test scores of respiratory parameters among children with Lower respiratory tract infections in experimental group. Find the effectiveness of breathing exercises as play way method on respiratory parameters among children with lower respiratory tract infections between experimental and control group. Association between post test scores of respiratory

		test	parameters among children with Lower respiratory tract infections with their selected demographic variables in experimental group

PROTECTION OF HUMAN SUBJECTS

The proposed study was conducted after the approval of dissertation committee. Written permission was obtained from the administrator and medical superintendent of Masonic hospital and Child Trust Hospital, Coimbatore. Oral consent was obtained from each selected sample. The confidentiality was maintained for the collected data.

CHAPTER IV
DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretations of the data to evaluate the effectiveness of breathing exercises as play way method on respiratory parameters among children with Lower respiratory tract infections in selected Hospitals, Coimbatore.

Data were collected from 60 children with Lower respiratory tract infections, 30 children under experimental group and 30 children under control group. The data obtained were analyzed and presented under following headings.

ORGANIZATION OF DATA

The data has been tabulated and organized as follows,

SECTION A **:** Distribution of demographic variables.

SECTION B **:** Assess the pre test and post test scores of respiratory parameters among children with Lower respiratory tract infections in experimental group.

SECTION C **:** Assess the pre test and post test scores of respiratory parameters among children with Lower respiratory tract infections in control group.

SECTION D : Compare the pre test and post test scores of respiratory parameters among children with Lower respiratory tract infections in experimental group.

SECTION E : Find the effectiveness of breathing exercises as play way method on respiratory parameters among children with lower respiratory tract infections between experimental and control group.

SECTION F : Association between post test scores of respiratory parameters among children with Lower respiratory tract infections with their selected demographic variables in experimental group.

SECTION A: Distribution of demographic variables

TABLE 1: Frequency and percentage distribution of demographic variables among children with lower respiratory tract infections in experimental group and control group

$n_1 = 30, n_2 = 30$

S.l NO	DEMOGRAPHIC VARIABLES	EXPERIMENTAL GROUP		CONTROL GROUP	
		F	**%**	**F**	**%**
1.	**Age of child (in years)**				
a)	5 to 8 years	19	63.3	19	63.3
b)	9 to 12 years	11	36.7	11	36.7
2.	**Sex**				
a)	Male	17	56.7	18	60
b)	Female	13	43.3	12	40
3	**Education (in std)**				
a)	UKG to I	7	23.3	9	30
b)	II to III	12	40	10	33.3
c)	IV to V	6	20	6	20

d)	VI to VII	5	16.7	5	16.7
4.	**Residence**				
a)	Rural area	16	53.3	16	53.3
b)	Urban area	14	46.7	14	46.7
5.	**Religion**				
a)	Hindu	22	73.4	21	70
b)	Christian	4	13.3	7	23.3
c)	Muslim	4	13.3	2	6.7
6.	**Pet animals in home**				
a)	Yes	16	53.3	20	66.7
b)	No	14	46.7	10	33.3

S.l NO	DEMOGRAPHIC VARIABLES	EXPERIMENTAL GROUP		CONTROL GROUP	
		F	%	F	%
7.	**Type of allergy**				
a)	Dust	12	40	12	40
b)	Season	4	13.3	8	26.7
c)	Food	-	-	-	-
d)	No allergy	14	46.7	10	33.3
8.	**Duration of breast feeding**				
a)	0-6 month	2	6.7	4	13.3
b)	6month -1 year	15	50	9	30
c)	1-2 year	13	43.3	17	56.7
9.	**Frequency of attack in last year**				
a)	1-2 times	23	76.7	25	83.3
b)	3 to 4 times	6	20	5	16.7
c)	5 and above	1	3.3	-	-

10.	**Duration of illness**				
a)	0 to 1 year	15	50	15	50
b)	2 to 3 years	11	36.7	13	43.3
c)	4 to 5 years	3	10	2	6.7
d)	Above 5 years	1	3.3	-	-

Table 1 shows the distribution of demographic variables among children with lower respiratory tract infections in both experimental group and control group.

Regarding age, in experimental group, majority of children 19(63.3%) belongs to the age of 5-8 years and 11(36.7%) belongs to the age of 9-12 years. In control group, majority of children 19(63.3%) belongs to the age of 5-8 years and least 11(36.7%) belongs to the age of 9-12 years (fig: 2)

Regarding sex, in experimental group, 17(56.7%) children were male and 13(43.3%) were female. In control group, majority of the children 18(6o%) were male and 12(40%) were female. (fig: 3)

With regard to education, in experimental group, 7(23.3%) belongs to UKG-I standard, 12(40%) belongs to II-III standard, 6(20%) belongs to IV-V standard and least 5 (16.7%) belong to VI-VII standard. In control group, 9(30%) belongs to UKG-I standard, 10(33.3%) belongs to II-III standard, 6(20%) belongs to IV-V standard and least 5(16.7%) belong to VI-VII standard (fig: 4)

Regarding residence, in experimental group, majority of the children 16(53.3%) were in rural area and least 14(46.7%) were in urban area. In control group, majority of the children 16(53.3%) were in urban area and least 14(46.7%) were in rural area.(fig: 5)

According to religion, in experimental group, majority of children 22(73.4%) were Hindus, 4(13.3%) were Christians and least 4(13.3%) were muslims. In control group, majority of children 21(70%) were Hindus,7 (23.3%) were Christians and least 2 (6.7%) were Muslims. (fig: 6)

Regarding pet animals in home, in experimental group, 16(53.3%) children had pet animals in home and 14(46.7%) children had pet animals in home. In control group, majority of the children 20(66.7%) had pet animals in home and least 10(33.3%) had no pet animals in home. (fig: 7)

Regarding to type of allergy, in experimental group, majority of children 12(40%) had dust allergy, 4(13.4%) had seasonal allergy and least 14(46.7%) had no allergy. In control group, majority of children 12(40%) had dust allergy, 8(26.7%) had seasonal allergy and least 10(33.3%) had no allergy. (fig: 8)

With regard to duration of breast feeding, in experimental group, 2(6.7%) children had 0-6 months breast feeding 15(50%) children had 6 months to 1 year breast feeding and least 13(43.3%) had 1-2 year breast feeding. In control group, majority of the children 17(56.7%) had 1-2 years of breast feeding, 9(30%) had6 months to 1 year breast feeding and least 4(13.3%) had 0-6months breast feeding. (fig: 9)

Regarding frequency of attack in last year, in experimental group, majority of children 23(76.7%) had 1-2 attacks, 6(20%) had 3-4 attacks and least 1(3.3%) had above 5attacks. In control group, majority of children 25(83.3%) had 1-2 attacks and least 5(16.7%) had 3-4 attack. (fig: 10)

With regard to duration of illness, in experimental group, majority of children 15(50%) had above 0-1year, 11(36.7%) had 2-3 year, 3(10%) had 4-5 years and least 1(3.3%) had above 5 years. In control group, majority of children 15 (50%) had 0-1 year, 13(43.3%) had 2-3 years and least 2(6.7%) had 4-5 year (fig: 11)

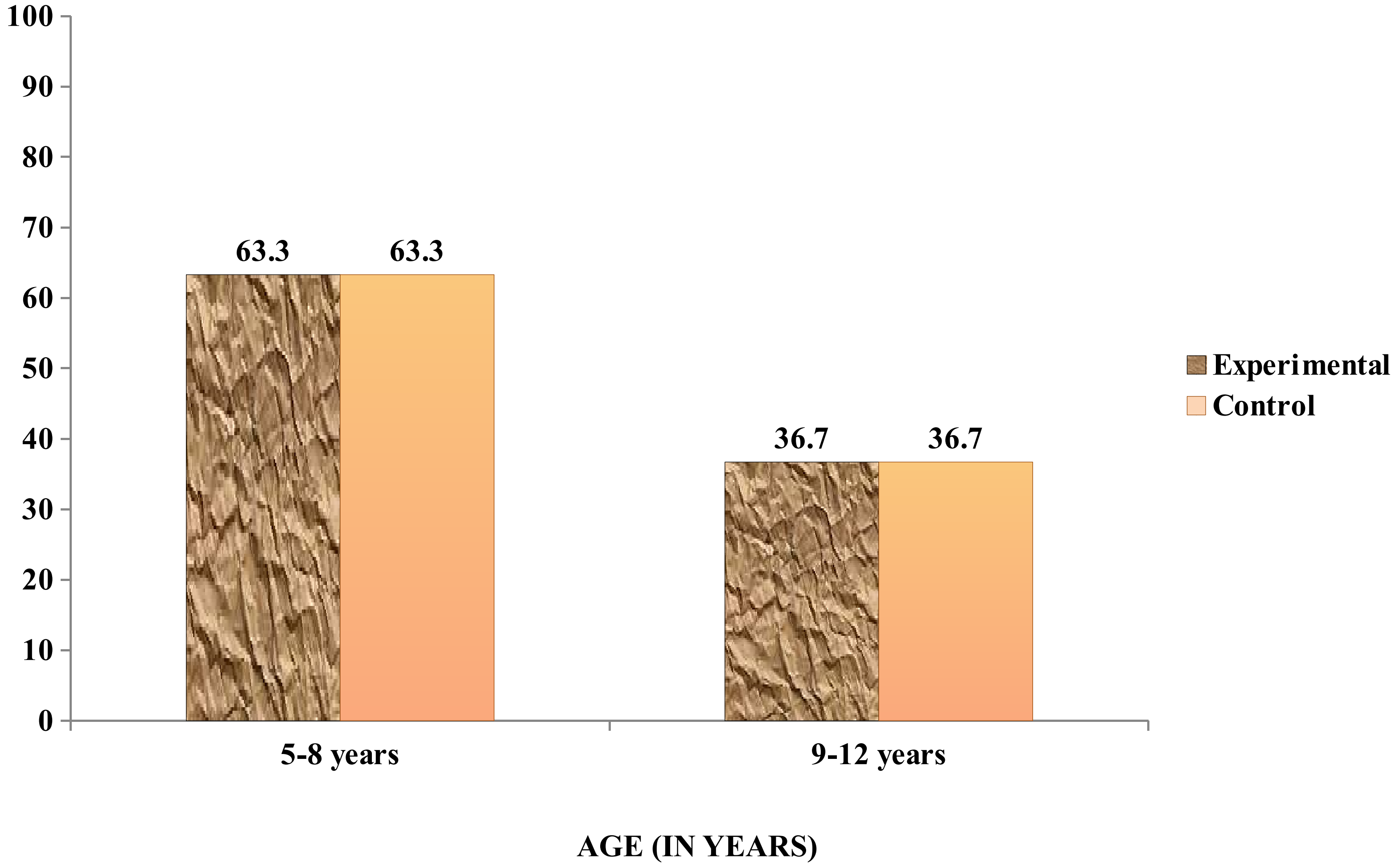


Fig 2: **Percentage distribution of children with lower respiratory tract infections according to their age in experimental and control group**

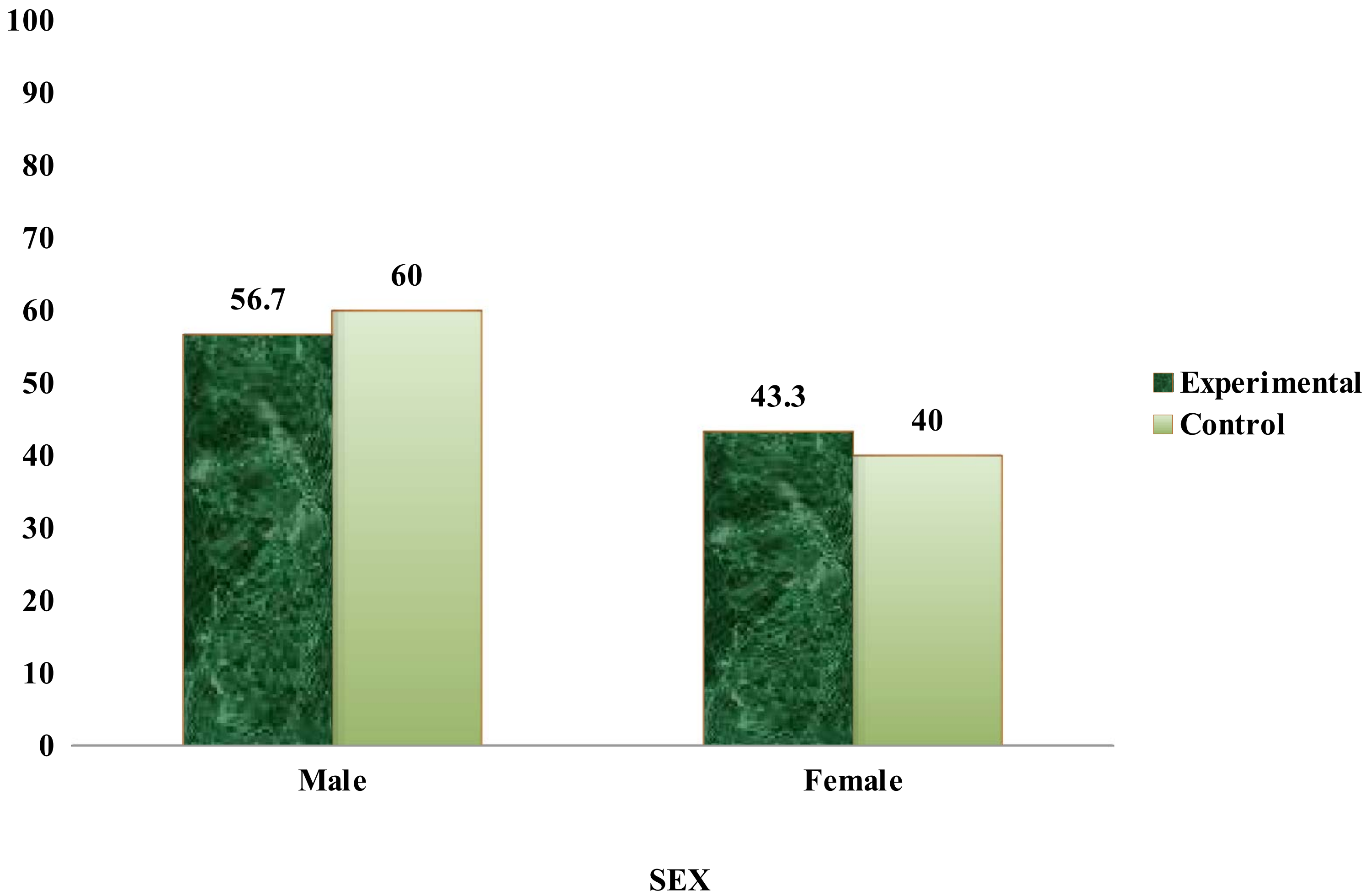


Fig 3: **Percentage distribution of children with lower respiratory tract infections according to their**

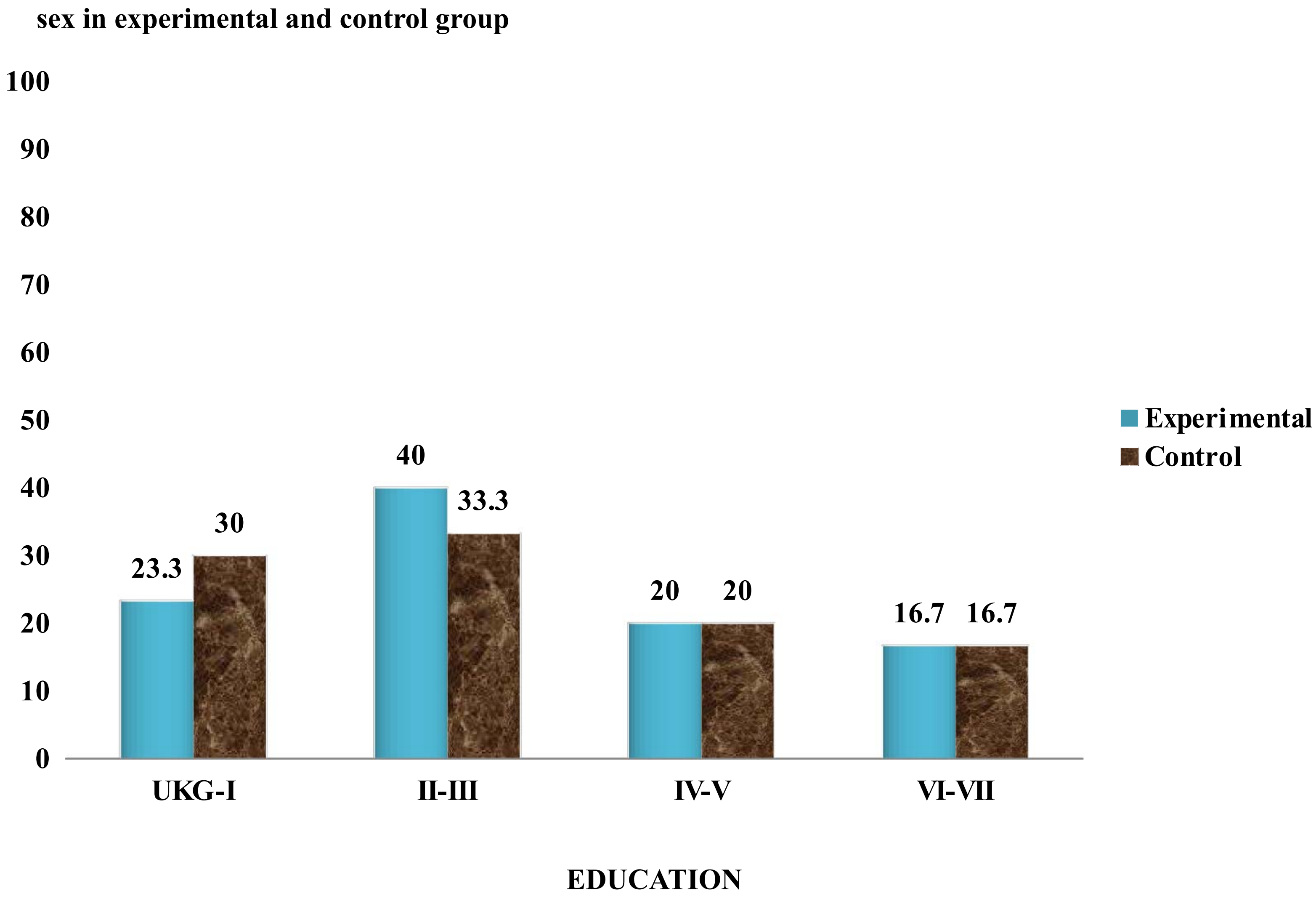
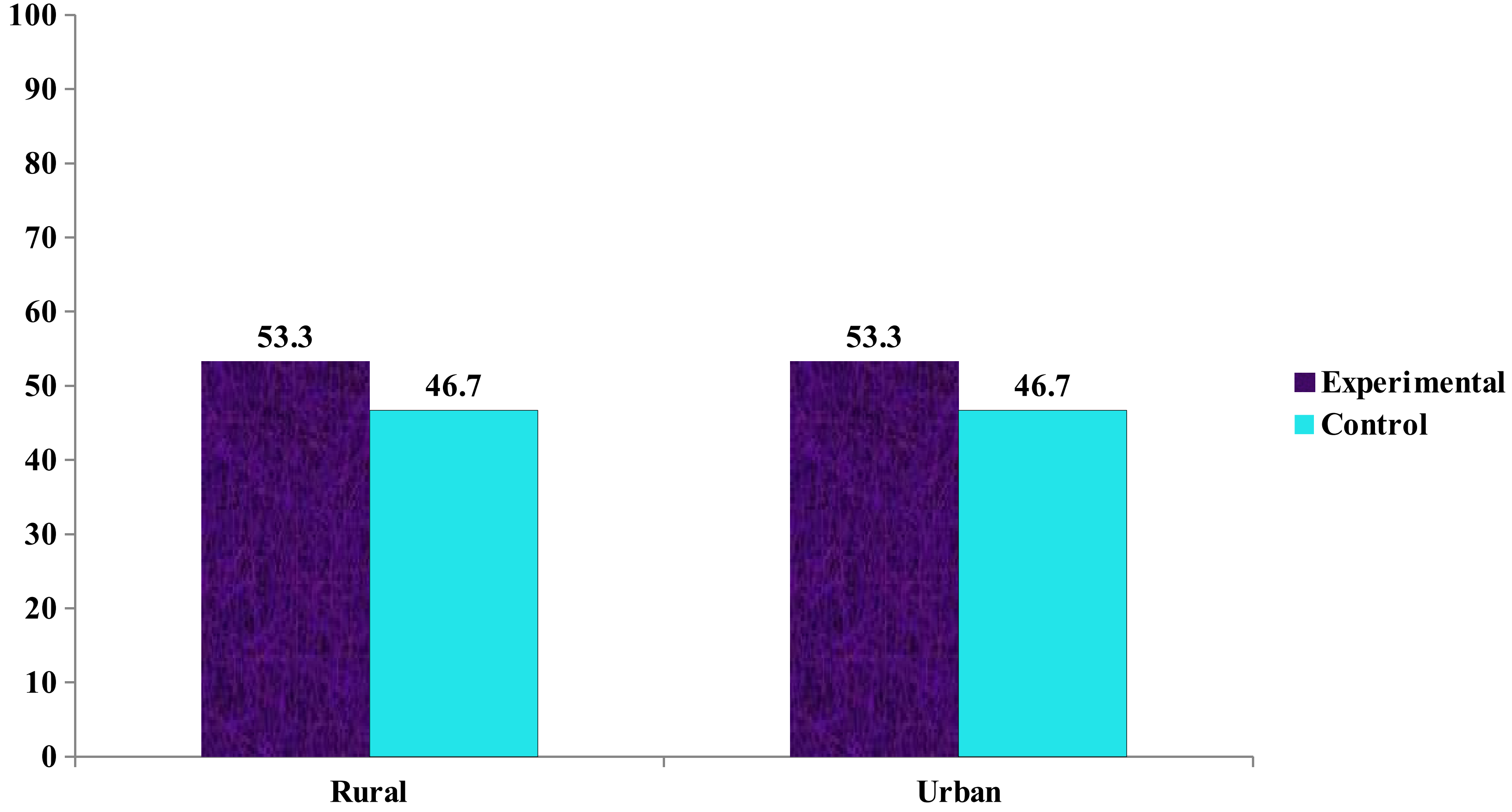
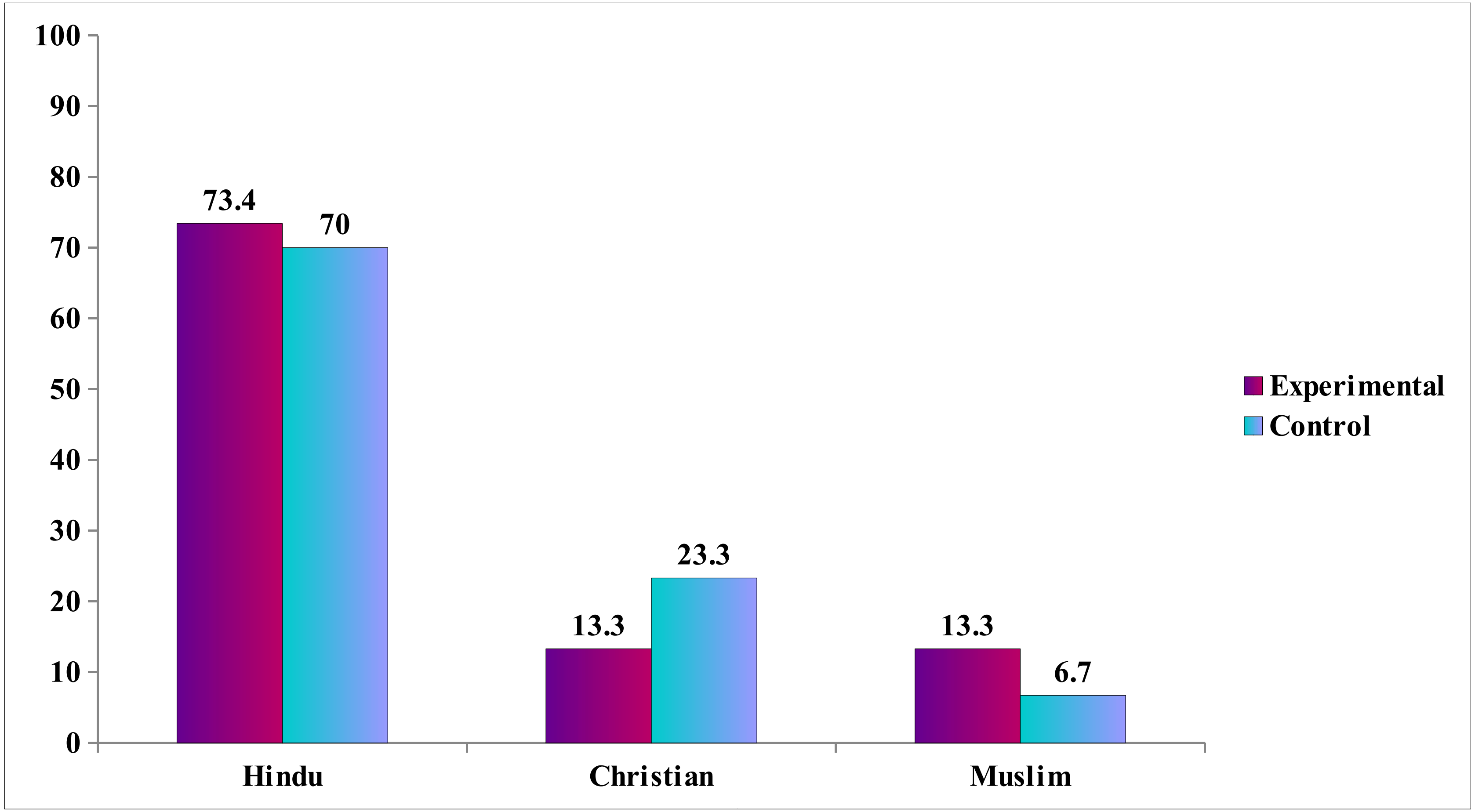

sex in experimental and control group
100
90
80
70
60
50
40
30
20
10
0
23.3
30
40
33.3
20
20
16.7
16.7
UKG-I
II-III
IV-V
VI-VII
EDUCATION
Experimental
Control

FIG 4: **Percentage distribution of children with lower respiratory tract infections according to their education in experimental and control group**



RESIDENCE

Fig 5: **Percentage distribution of children with lower respiratory tract infections according to their residence in experimental and control group**



RELIGION

Fig 6: Percentage distribution of children with lower respiratory tract diseases according to their religion

in experimental and control group

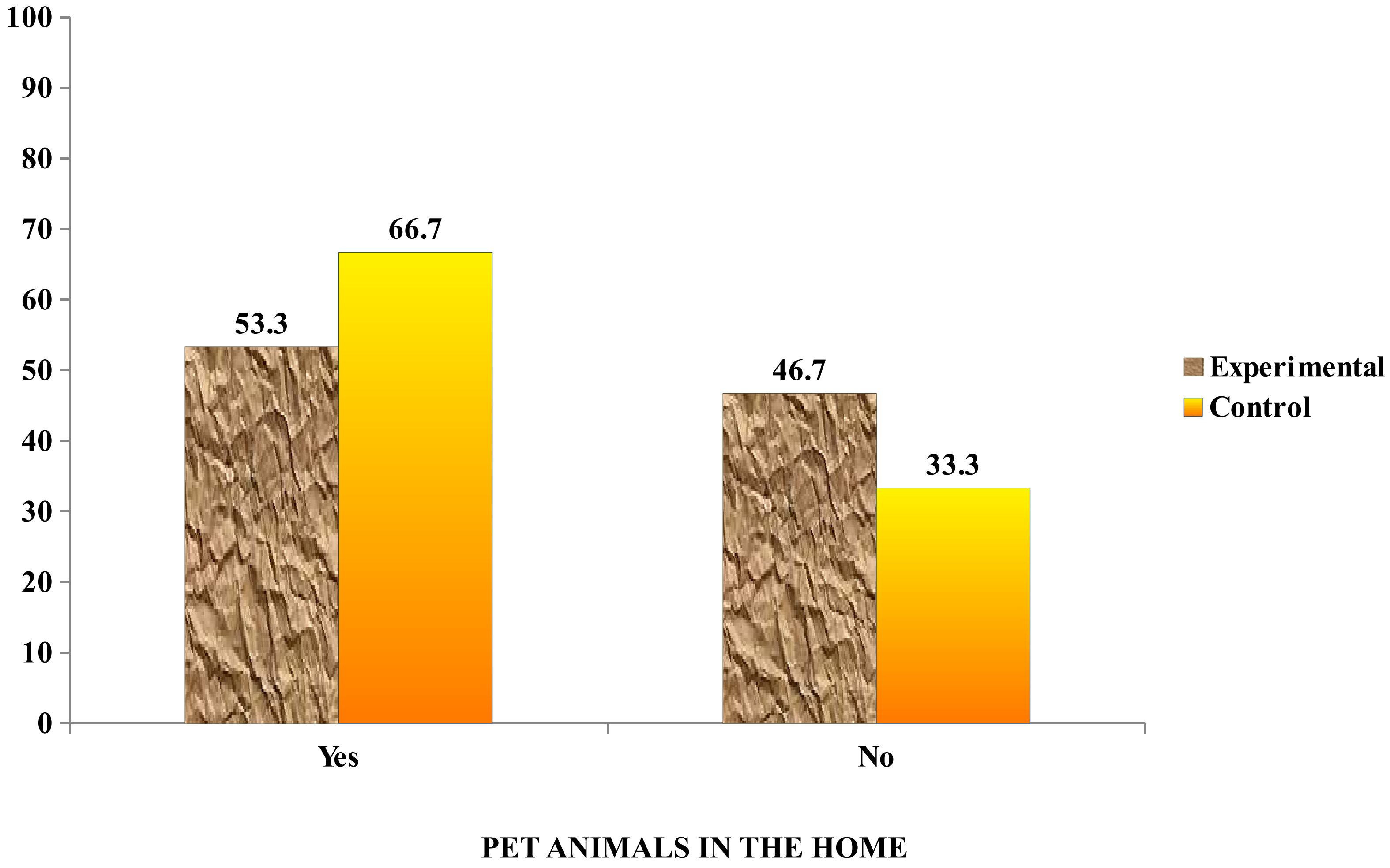


Fig 7: **Percentage distribution of children with lower respiratory tract infections according to the pet animals in the home in experimental and control group**

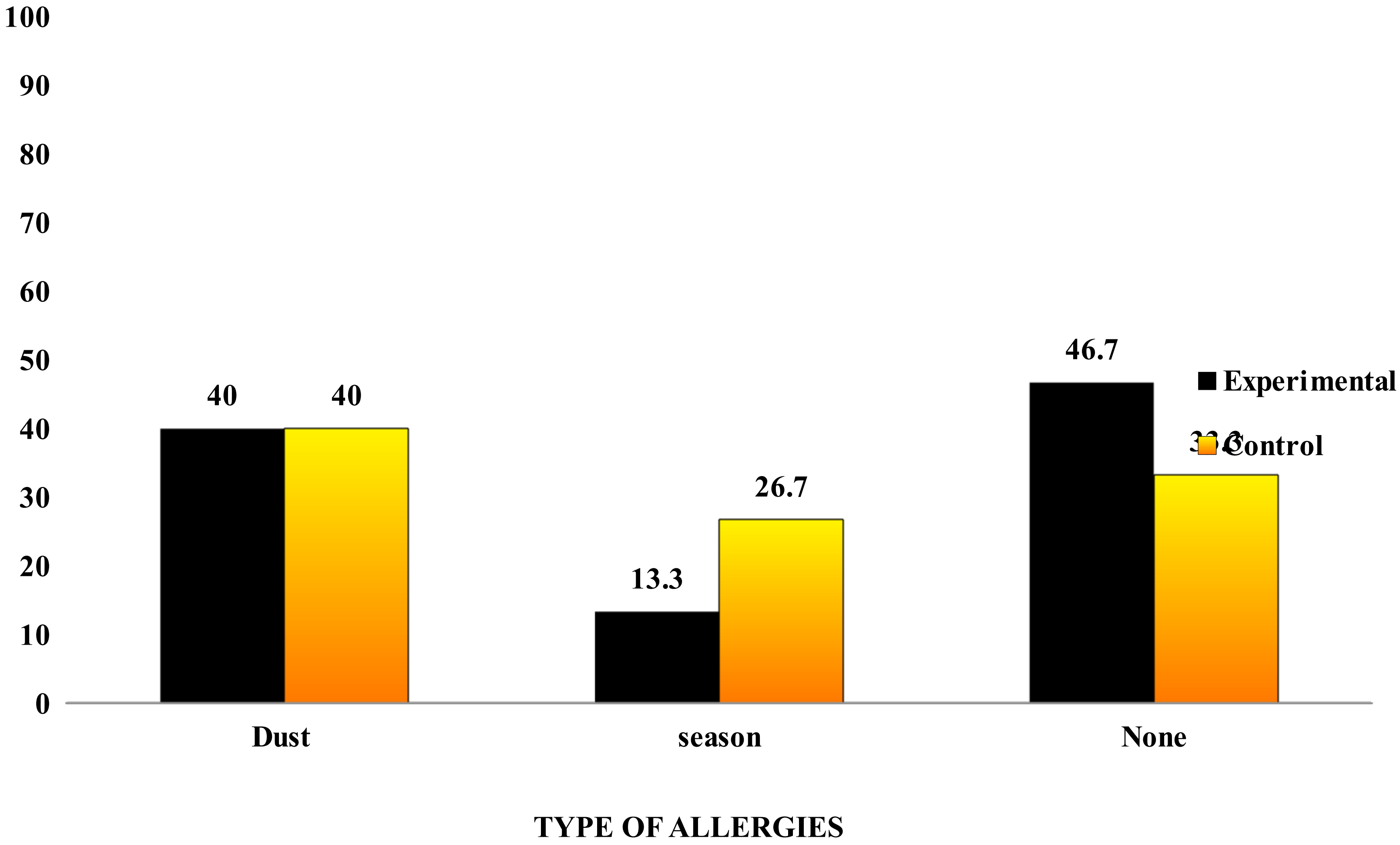
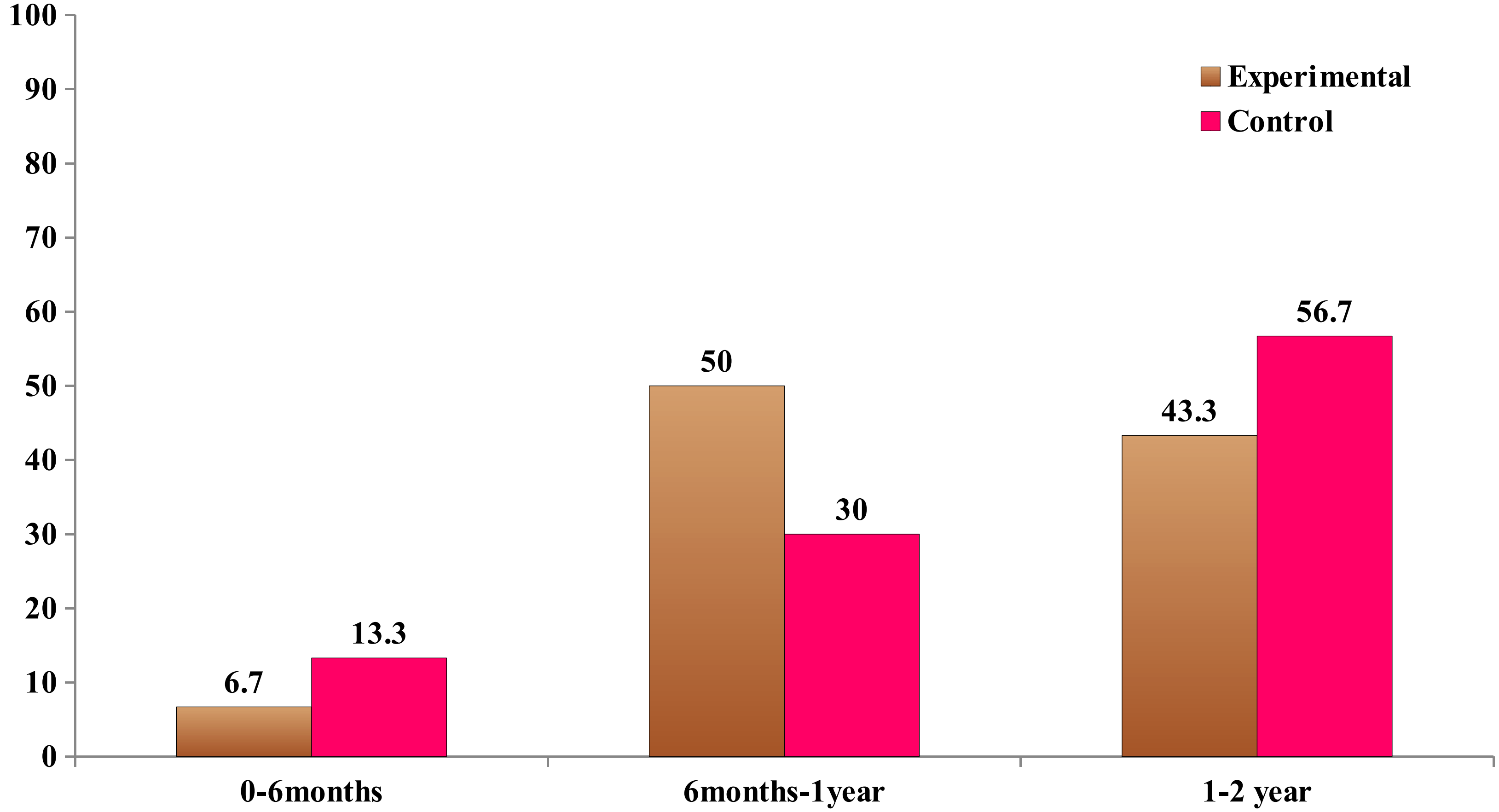
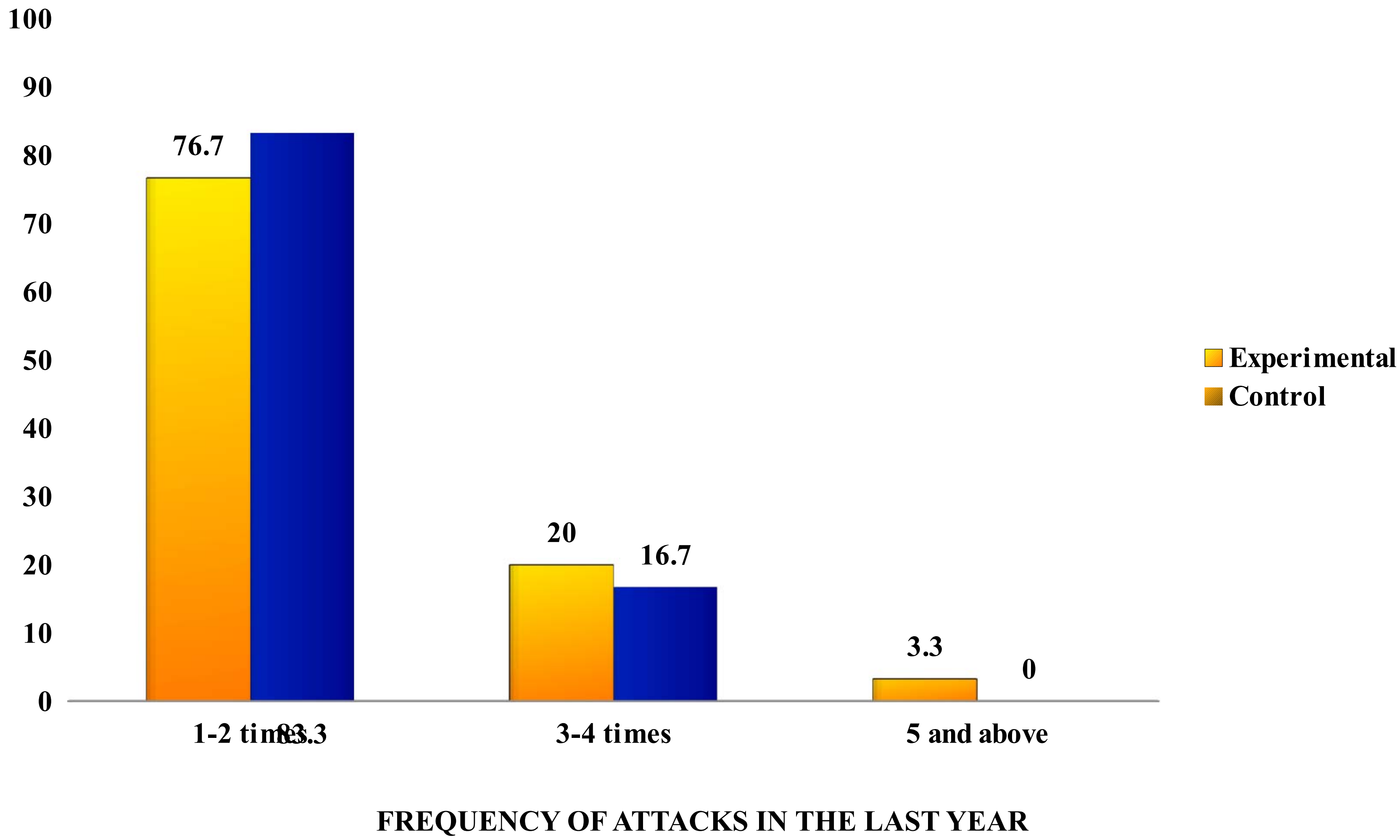


Fig 8: **Percentage distribution of children with lower respiratory tract infections according to their type of allergies in experimental and control group**



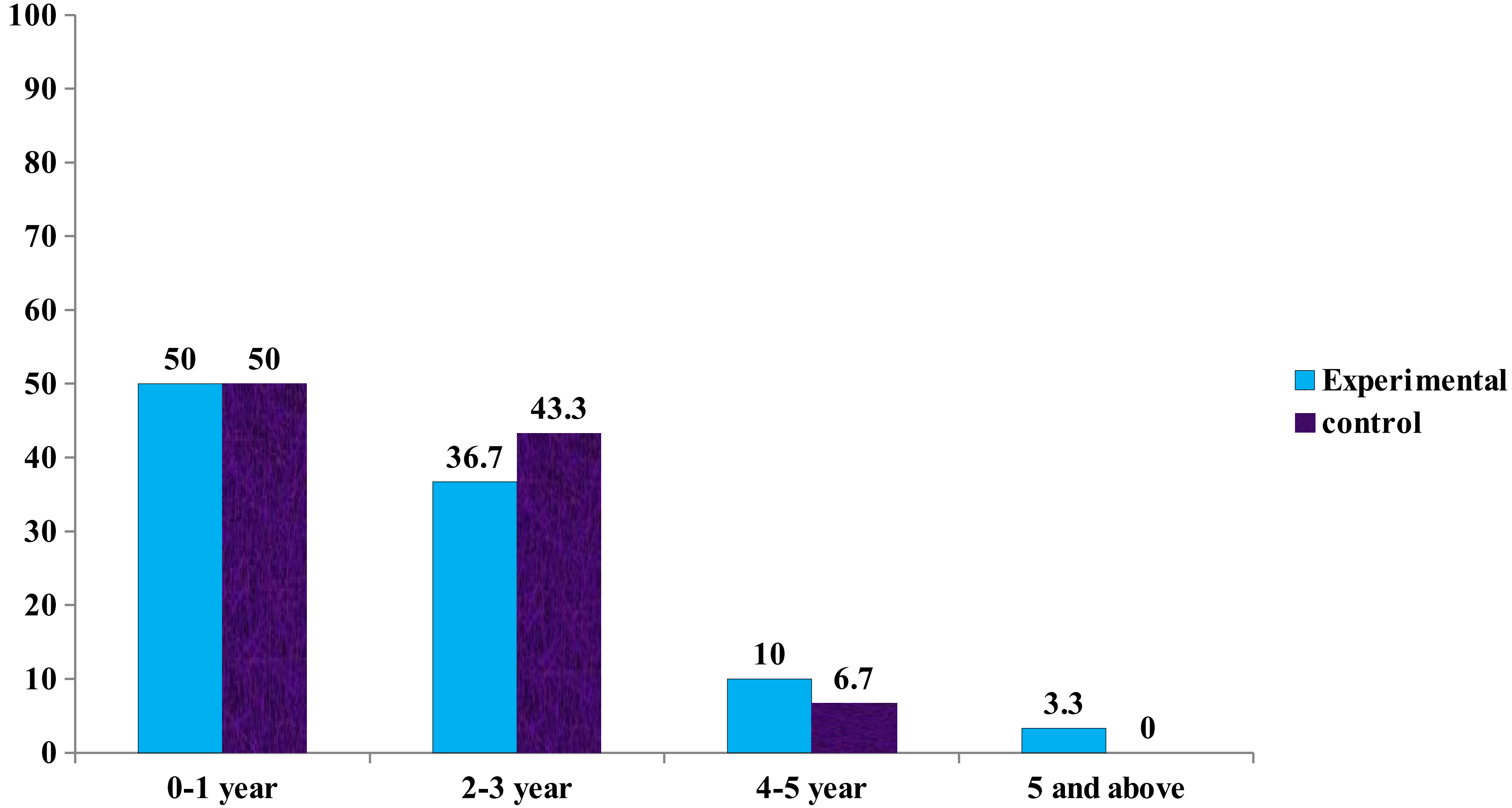
DURATION OF BREAST FEEDING

Fig 9: Percentage distribution of children with lower respiratory tract infections according duration of breast feeding in experimental and control group



100
90
80
70
60
50
40
30
20
10
0
76.7
83.3
20
16.7
3.3
0
1-2 times
3-4 times
5 and above
Experimental
Control
FREQUENCY OF ATTACKS IN THE LAST YEAR

Fig 10: **Percentage distribution of children with lower respiratory tract infections according to the number of attacks in the last year in experimental and control group**



DURATION OF ILLNESS

Fig 11: Percentage distribution of children with lower respiratory tract infections according to Duration of illness in experimental and control group

SECTION B: **Assess the pre test and post test scores of respiratory parameters among children with Lower respiratory tract infections in experimental group**

TABLE 2: Frequency and percentage distribution of pre test and post test scores of respiratory parameters among children with lower respiratory tract infections in experimental group

n = 30

RESPIRATORY PARAMETERS IN EXPERIMENTAL GROUP	PRE TEST		POST TEST	
	F	%	F	%
Peak flow rate				
Normal (90-100%)	-	-	16	53.3
Mild (70-89%)	8	26.6	11	36.7
Moderate (50-69%)	17	56.7	3	10
Severe (<50%)	5	16.7	-	-
Forced expiratory volume				
Normal (80-100%)	-	-	20	66.7
Mild (70-79%)	2	6.7	6	20
Moderate (60-69%)	3	10	4	13.3
Severe (<60%)	25	83.3	-	-

Table 2: Depicts that, Peak flow rate scores in pre test, 5(16.7%) children had severe grade, 17(56.7%) children had moderate grade and 8(26.6%) children had mild grade. In post test, 3(10%) children had moderate grade, 11 (40%) children had mild grade, and 16 (53.3%) had normal grade. (fig: 12)

According to the forced expiratory volume scores in pre test, 25(83.3%) children had severe level, 3(10%) children had moderate level and 2(6.7%) children had mild level. In post test, 20(66.7%) children had normal, 6(20%) children had mild and 4(13.3%) had moderate level. (fig: 13)

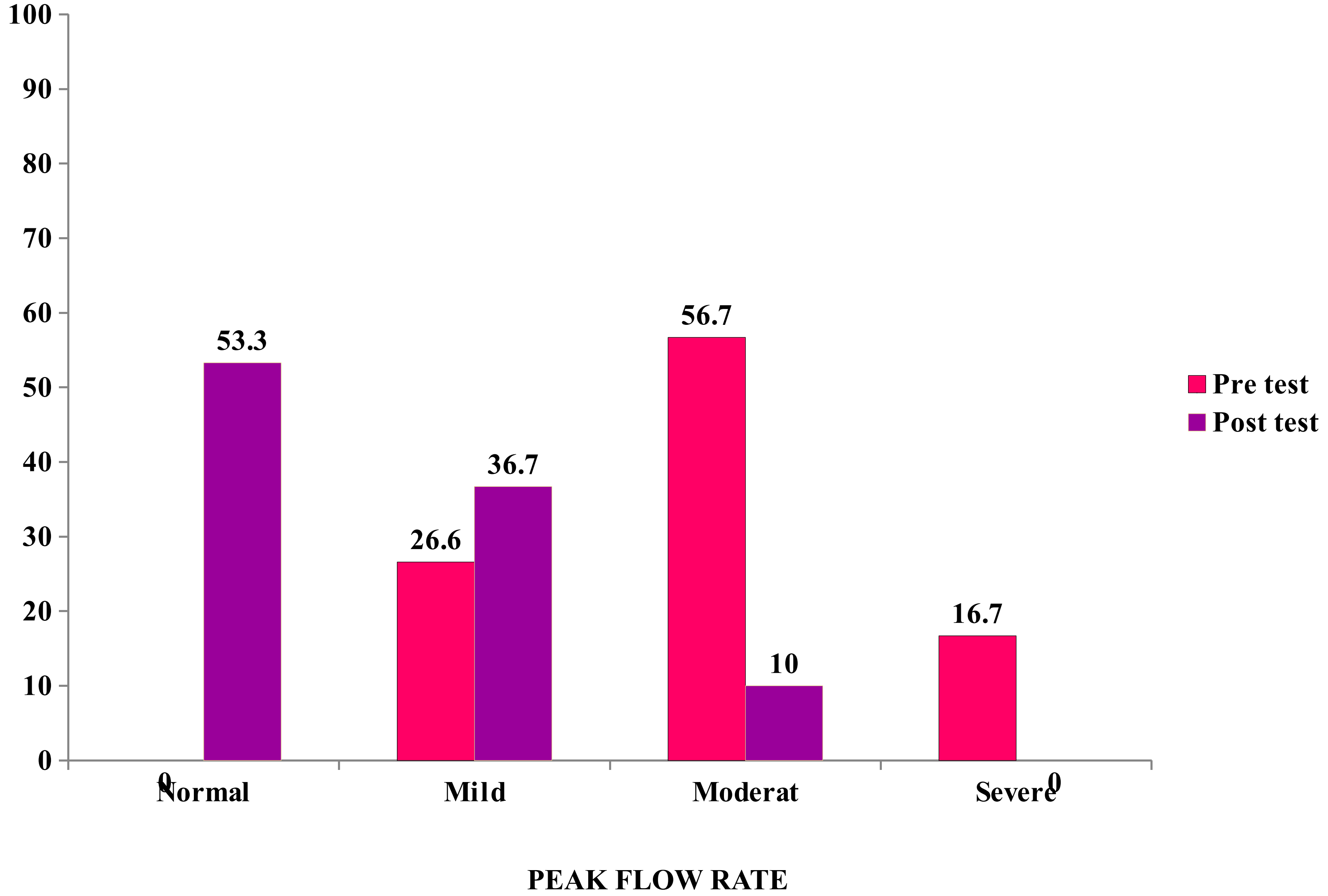
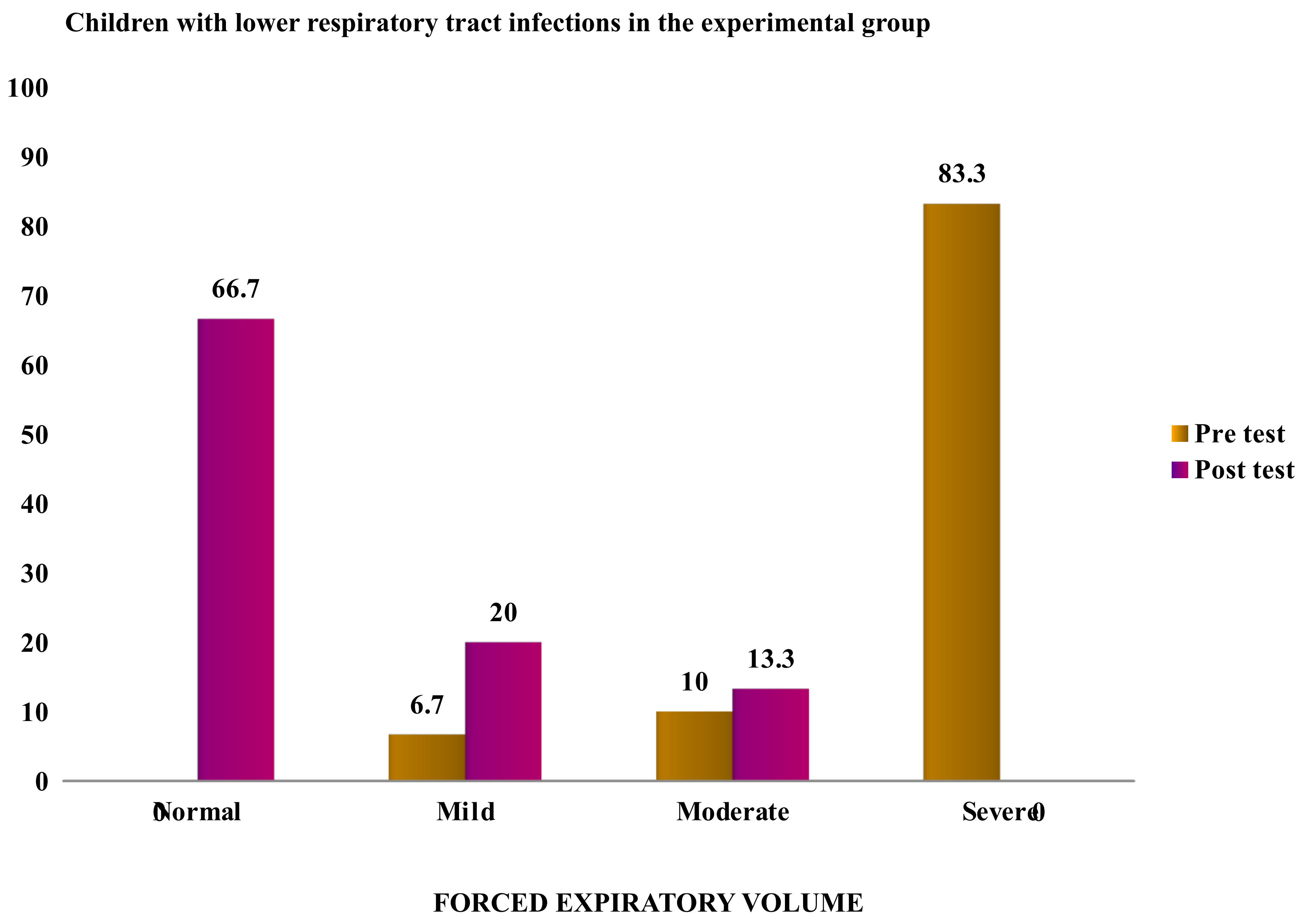


Fig: 12 Frequency and percentage distribution of pre test and post test scores of peak flow rate among



Children with lower respiratory tract infections in the experimental group
100
90
80
70
60
50
40
30
20
10
0
66.7
6.7
20
10
13.3
83.3
0
0
Normal
Mild
Moderate
Severe
Pre test
Post test
FORCED EXPIRATORY VOLUME

Fig: 13 Frequency and percentage distribution of pre test and post test scores of forced expiratory volume among children with lower respiratory tract infections in the experimental group

SECTION C: Assess the pre test and Post test scores of respiratory parameters among children with Lower respiratory tract infections in control group

TABLE 3: Frequency and percentage distribution of pre test and post test scores of respiratory parameters among children with lower respiratory tract infections in control group

n= 30

RESPIRATORY PARAMETERS IN CONTROL GROUP	PRE TEST		POST TEST	
	F	%	F	%
Peak flow rate				
Normal (90-100%)	-	-	1	3.3
Mild (70-89%)	4	13.3	9	30
Moderate (50-69%)	22	73.4	18	60
Severe (<50%)	4	13.3	2	6.7
Forced expiratory volume				
Normal (80-100%)	-	-	3	10
Mild (70-79%)	4	13.3	5	16.7
Moderate (60-69%)	10	33.3	7	23.3
Severe (<60%)	16	53.4	15	50

Table 3: Depicts that, Peak flow rate scores in pre test, 4(13.3%) children had severe grade, 22(73.4%) children had moderate grade and 4(13.3%) children had mild grade. In post test, 2(6.7%) children had severe grade, 18(60%) children had moderate grade, 9(30%) had mild grade and 1(3.3%) child had normal grade (fig: 14)

According to forced expiratory volume, in pre test, 16(53.4%) children had severe level, 10(33.3%) children had moderate level and 4(13.3%) children had mild level. In post test, 15(50%) children had severe level, 7(23.3%) children had moderate level,5(16.7%)children had mild level and 3(10%) had normal level (fig:15).

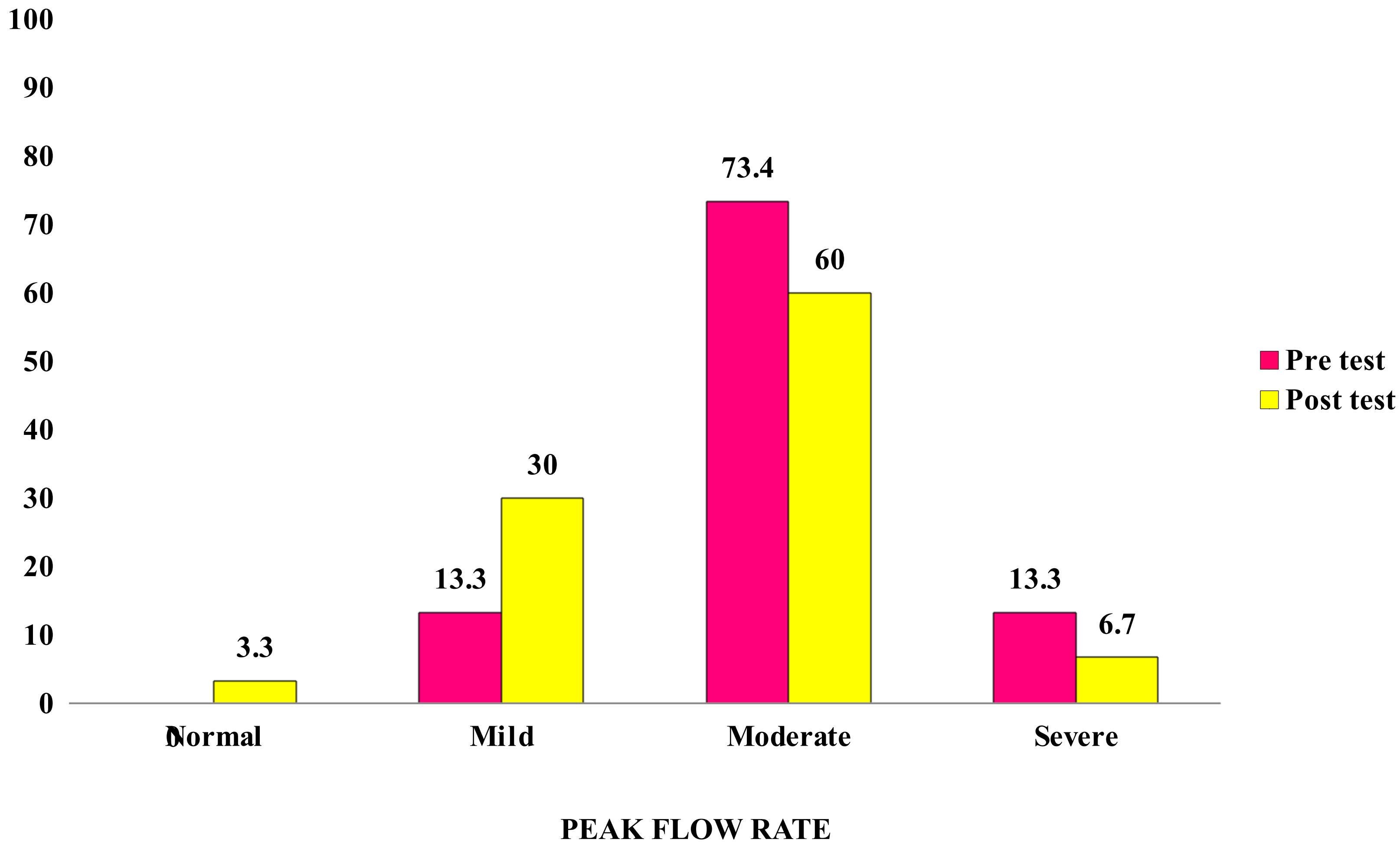
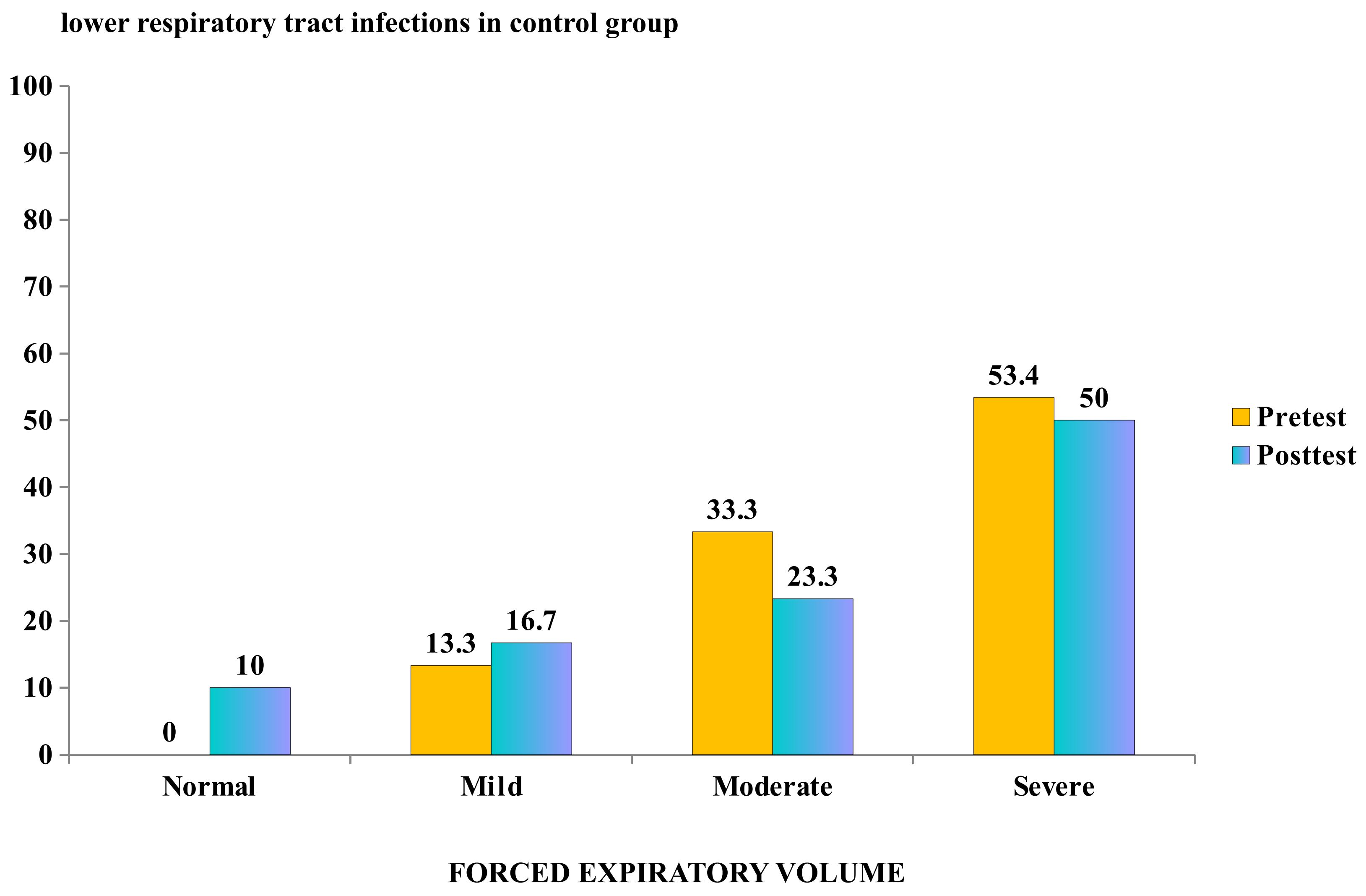


Fig 14: **Percentage distribution of pre test and post test scores of peak flow rate among children with**



lower respiratory tract infections in control group
100
90
80
70
60
50
40
30
20
10
0
0
10
13.3
16.7
33.3
23.3
53.4
50
Pretest
Posttest
Normal
Mild
Moderate
Severe
FORCED EXPIRATORY VOLUME

Fig 15: Percentage distribution of pre test and post test scores of forced expiratory volume among children with lower respiratory tract infections in control group

SECTION D: Compare the pretest and post test scores of respiratory parameters among children with Lower respiratory tract infections in experimental group.

TABLE 4: Comparison of Mean, standard deviation and paired't' value between pre test and post test scores of Peak flow rate among children with lower respiratory tract infections in experimental group

n= 30

Peak flow rate	Mean	SD	Mean difference	Paired 't' value	Table value	Remark
Pre test	123.23	46.13	53.17	8.54	2.045	S
Post test	176.4	60.87				

d(f)29 S-Significance P<0.05

Table 4: depicts that, the post test mean score 176.4 (SD±60.87) higher than the pre test mean score 123.23 (SD±46.13) and mean difference was (53.17). The paired't' value was 8.54 (table value= 2.045) which is significant at P< 0.05 level. The finding revealed that there is a significant improvement of post test Peak flow rate in experimental group.

TABLE 5: Comparison of Mean, standard deviation and paired ‘t’ value between pre test and post test scores of forced expiratory volume among children with lower respiratory tract infections in experimental group

n=30

Variable	Mean	SD	Mean difference	Paired ‘t’ value	Table value	Remark
Pre test	0.60	0.194	0.41	7.2	2.045	S
Post test	1.01	0.382				

d(f) 29 S-significance P<0.05

Table 5: depicts that, the post test mean score 1.01 (SD±0.382) higher than the pre test mean score 0.60(SD±0.194) and mean difference was (0.41). The paired ‘t’ value was 7.2 (table value= 2.045) which is significant at P< 0.05 level. The finding revealed that there is a significant improvement of post test forced expiratory volume in experimental group.

Therefore the hypothesis H_1 that the mean post test scores of respiratory parameters are significantly higher than the mean pre test scores of respiratory parameters in experimental group, was accepted.

SECTION E: To find the effectiveness of breathing exercises as play way method on respiratory parameters among children with lower respiratory tract infections between experimental and control group.

TABLE 6 : Comparison of Mean, standard deviation and independent 't' value of post test scores of Peak flow rate among children with lower respiratory tract infections between experimental group and control group

$n_1 = 30$, $n_2 = 30$

Group	Mean	SD	Mean difference	Independent 't' value	Table value	Remark
Experimental group	176.4	60.8	66.5	7.82	2.0	S
Control group	109.9	46.3				

d(f) 58 S-significance

P<0.05

Table 6 Depicts that the mean post test scores of peak flow rate in the experimental group 176.4 (SD±60.8) was significantly higher than the mean post test scores of peak flow rate in control group 109.9 (SD±46.3) and the mean difference was (66.5). Independent 't' value 7.82 (table value= 2.0017) which is significant at P< 0.05 level. The finding revealed that there is a significant improvement in peak flow rate between experimental group and control group, which showed that breathing exercises is effective for children with Lower respiratory tract infections.

TABLE 7: Comparison of Mean, standard deviation and independent‘t’ value of post test scores of forced expiratory volume among children with lower respiratory tract infections between experimental group and control group

$n_1 = 30, n_2 = 30$

Group	Mean	SD	Mean difference	Independent ‘t’ value	Table value	Remark
Experimental group	1.09	0.38	0.42	4.49	2.0	S
Control group	0.67	0.21				

d(f)58 S-Significance

P<0.05

Table 7: depicts the mean post test scores of forced expiratory volume in the experimental group 1.09 (SD±0.38) was significantly higher than the mean post test scores of forced expiratory volume in control group 0.67 (SD±0.21) and the mean difference was (0.42). Independent ‘t’ value 4.49 (table value=2.0017) which is significant at $P < 0.05$ level. The finding revealed that there is a significant improvement in the forced expiratory volume between experimental group and control group, which showed that breathing exercises are effective for children with Lower respiratory tract infections.

Therefore the hypothesis H_2 that the mean post test scores of respiratory parameters in experimental group is significantly higher than the mean post test scores of respiratory parameters in control group was accepted.

SECTION E: **Association between post test scores of respiratory parameters among children with Lower respiratory tract infections with their selected demographic variables in experimental group**

TABLE 8: Association between post test scores of peak flow rate among children with lower respiratory infections with their selected demographic variables in experimental group

n=30

Demographic variables	Normal		Mild		Moderate		severe		χ2	T.V	Remarks
	F	%	F	%	F	%	F	%			
Age											
5-8 years	11	36.6	5	16.7	3	10	-	-	3.44	5.99 (df=2)	NS
9-12 years	5	16.7	6	20	-	-	-	-			
Sex											
Male	10	33.4	4	13.3	3	10	-	-	4.24	5.99 (df=2)	NS
Female	6	20	7	23.3	0	-	-	-			
Education											
UKG-I	2	6.7	3	10	2	6.7	-	-	11.7	12.59 (df=6)	NS
II –III	9	30	2	6.7	1	3.3	-	-			
IV- V	2	6.7	4	13.2	-	-	-	-			
VI-VII	3	10	2	6.7	-	-	-	-			
Residence											
Rural	7	23.3	8	26.7	1	3.3	-	-	2.78	5.99 (df=2)	NS
Urban	9	30	3	10	2	6.7	-	-			

Demographic variables	Normal		Mild		Moderate		severe		χ2	T.V	Remarks
	F	%	F	%	F	%	F	%			
Religion											
Hindu	12	40	7	23.2	3	10	-	-		9.49	
Christian	2	6.7	2	6.7	-	-	-	-	1.26	(df=4)	NS
Muslim	2	6.7	2	6.7	-	-	-	-			
Pet animals in the home										5.99	
Yes	9	30	6	20	1	3.3	-	-	0.64	(df=2)	NS
No	7	23.3	5	16.7	2	6.7	-	-			
Type of allergy											
Dust	6	20	5	16.7	1	3.3	-	-		9.49	
Season	3	10	1	3.3	-	-	-	-	1.32	(df=4)	NS
Food	-	-	-	-	-	-	-	-			
None	7	23.3	5	16.7	2	6.7	-	-			
Duration of breast feeding								-		9.49	
0-6 months	1	3.3	1	3.3	-	-	-	-	1.89	(df=4)	NS
6month-1yr	9	30	4	13.4	2	6.7	-	-			
1-2 year	6	20	6	20	1	3.3	-				
Frequency of attacks in the last year											
1-2Times	11	36.7	10	33.3	2	6.7	-	-		9.49	S
3-4 times	5	16.7	1	3.3	-	-	-	-	11.7	(df=4)	

5 and above	-		-	-	1	3.3	-	-			

Demographic variables	**Normal**		**Mild**		**Moderate**		**severe**		**χ2**	**T.V**	**Remarks**
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**			
Duration of illness											
1.1 years	6	20	7	23.3	2	6.7	-	-	6.77	12.59 (df=6)	NS
2-3 years	8	26.7	2	6.7	1	3.3	-	-			
4-5 years	2	6.7	1	3.3	-	-	-	-			
Above 5 years	-	-	1	3.3	-	-	-	-			

NS-Non significant, S-Significant (P < 0.05)

Table 8: Depicts that, Chi-square was calculated to find the association between the peak flow rates with their selected demographic variables in experimental group. There was no significant association found between peak flow rate in relation to age (χ^2 =3.44), sex (χ^2 =4.42), education (χ^2 =11.7), residence (χ^2 =2.78), religion (χ^2 =1.26), pet animals in the house (χ^2 =0.64), duration of breast feeding (χ^2 =1.89), type of allergy (χ^2 =1.32) and duration of illness (χ^2 =6.77) except frequency of attacks in the last year(χ^2 =11.7).

Table 9: Association between post test scores of forced expiratory volume among children with lower respiratory tract infections with their selected demographic variables in experimental group

n=30

Demographic variables	Normal		Mild		Moderate		severe		χ2	T.V	Remarks
	F	%	F	%	F	%	F	%			
Age											
5-8 years	12	40	4	13.3	3	10	-	-	0.36	5.99 (df=2)	NS
9-12 years	8	26.7	2	6.7	1	3.3	-	-			
Sex											
Male	12	40	3	10	2	10	-	-	2.41	5.99 (df=2)	NS
Female	8	26.7	3	10	2	3.3	-	-			
Education											
UKG-I	5	16.7	1	3.3	1	3.3	-	-	4.33	12.59 (df=6)	NS
II –III	8	26.7	2	6.7	2	6.7	-	-			
IV- V	3	10	3	10	-	-	-	-			
VI-VII	4	13.3	-	-	1	3.3	-	-			
Residence											
Rural	12	40	2	6.7	2	6.7	-	-	1.35	5.99 (df=2)	NS
Urban	8	26.7	4	13.2	2	6.7	-	-			
Religion											
Hindu	15	50	4	13.4	3	10	-	-	1.8	9.49 (df=4)	NS
Christian	3	10	1	3.3	-	-	-	-			
Muslim	2	6.7	1	3.3	1	3.3	-	-			

Pet animals in the home									1.26	5.99 (df=2)	NS
Yes	11	36.7	2	6.7	3	10	-	-			
No	9	30	4	13.3	1	3.3	-	-			

Demographic variables	Normal		Mild		Moderate		severe		χ2	T.V	Remarks
	F	%	F	%	F	%	F	%			
Type of allergy									5.91	12.59 (df=6)	NS
Dust	8	26.7	4	13.3	-	-	-	-			
Season	3	10	-	-	1	3.3	-	-			
Food	-	-	-	-	-	-	-	-			
None	9	30	2	6.7	3	10	-	-			
Duration of breast feeding									1.17	9.49 (df=4)	NS
0-6 months	2	6.7	-	-	-	-	-	-			
6month-1yr	10	33.3	3	10	2	6.7	-	-			
1-2 year	8	26.6	3	10	2	6.7	-	-			
Frequency of attacks in the last year									4.30	9.49 (df=4)	NS
1-2Times	15	50	6	20	2	6.7	-	-			
3-4 times	4	13.3	-	-	2	6.7	-	-			
5 and above	1	3.3	-	-	-	-	-	-			
Duration of illness									8.64	12.59 (df=6)	NS
1.2 years	11	36.7	3	10	1	3.3	-	-			
2-3 years	8	26.7	2	6.8	1	3.3	-	-			
4-5 years	1	3.3	1	3.3	1	3.3	-	-			
Above 5 years	-	-	-	-	1	3.3	-	-			

NS-Non significant (P < 0.05)

Table 9: Depicts that, Chi-square was calculated to find the association between forced expiratory volume scores with their selected demographic variables in experimental group. There was no significant association found between forced expiratory volume in relation to age (χ^2 =0.36) sex (χ^2 = 2.41), education (χ^2 =4.33), residence (χ^2 =1.35), religion (χ^2 =1.8), pet animals in the house (χ^2 =1.26), type of allergy (χ^2 =5.91), duration of breast feeding (χ^2 =1.17), frequency of attacks in the last year (χ^2 =4.30) and duration of illness (χ^2 =8.64)

Therefore the hypothesis H_3 that there is a significant association between post test scores of respiratory parameters among children with Lower respiratory tract infections with their selected demographic variables in experimental group, was rejected except for frequency of attacks in the last year (χ^2=11.71)

CHAPTER – V

DISCUSSION

The discussion chapter deals with sample characteristics and objectives of the study. The aim of present study was to evaluate the effectiveness of breathing exercises as play way method on respiratory parameters among children with Lower respiratory tract infections in selected Hospitals, Coimbatore.

DESCRIPTION OF DEMOGRAPHIC VARIABLES

Regarding age, in experimental group, majority of children 19(63.3%) belongs to the age of 5-8 years and 11(36.7%) belongs to the age of 9-12 years. In control group, majority of children 19(63.3%) belongs to the age of 5-8 years and least 11(36.7%) belongs to the age of 9-12 years.

Regarding sex, in experimental group, 17(56.7%) children were male and 13(43.3%) were female. In control group, majority of the children 18(60%) were male and 12(40%) were female.

With regard to education, in experimental group, 7(23.3%) belongs to UKG-I standard, 12(40%) belongs to II-III standard, 6(20%) belongs to IV-V standard and least 5 (16.7%) belong to VI-VII standard. In control group, 9(30%) belongs to UKG-I standard, 10(33.3%) belongs to II-III standard, 6(20%) belongs to IV-V standard and least 5(16.7%) belong to VI-VII standard.

Regarding residence, in experimental group, majority of the children 16(53.3%) were in rural area and least 14(46.7%) were in urban area. In control group, majority of the children 16(53.3%) were in urban area and least 14(46.7%) were in rural area.

According to religion, in experimental group, majority of children 22(73.4%) were Hindus, 4(13.3%) were Christians and least 4(13.3%) were Muslims. In control group, majority of children 21(70%) were Hindus, 7 (23.3%) were Christians and least 2 (6.7%) were Muslims.

Regarding pet animals in home, in experimental group, 16(53.3%) children had pet animals in home and 14(46.7%) children had no pet animals in home. In control group, majority of the children 20(66.7%) had pet animals in home and least 10(33.3%) had no pet animals in home.

Regarding to type of allergy, in experimental group, majority of children 12(40%) had dust allergy, 4(13.4%) had seasonal allergy and least 14(46.7%) had no allergy. In control group, majority of children 12(40%) had dust allergy, 8(26.7%) had seasonal allergy and least 10(33.3%) had no allergy.

With regard to duration of breast feeding, in experimental group, 2(6.7%) children had 0-6 months breast feeding 15(50%) children had 6 months to 1 year breast feeding and least 13(43.3%) had 1-2 year breast feeding. In control group, majority of the children 17(56.7%) had 1-2 years of breast feeding, 9(30%) had6 months to 1 year breast feeding and least 4(13.3%) had 0-6months breast feeding.

Regarding frequency of attack in last year, in experimental group, majority of children 23(76.7%) had 1-2 attacks, 6(20%) had 3-4 attacks and least 1(3.3%) had above 5attacks. In control group, majority of children 25(83.3%) had 1-2 attacks and least 5(16.7%) had 3-4 attack.

With regard to duration of illness, in experimental group, majority of children 15(50%) had above 0-1year, 11(36.7%) had 2-3 year, 3(10%) had 4-5 years and least 1(3.3%) had above 5 years. In control group, majority of children 15 (50%) had 0-1 year, 13(43.3%) had 2-3 years and least 2(6.7%) had 4-5 year.

THE FINDINGS OF THE STUDY WERE DISCUSSED ACCORDING TO THE OBJECTIVES AS FOLLOWS

1. To assess the pre-test and post test scores of respiratory parameters among children with lower respiratory tract infections in experimental group.
2. To assess the pre- test and post test scores of respiratory parameters among children with lower respiratory tract infections in control group.
3. To compare the pretest and post test scores of respiratory parameters among children with lower respiratory tract infections in experimental group
4. To find the effectiveness of breathing exercises as play way methods on respiratory parameters among children with lower respiratory tract infections between experimental and control group.
5. To find the association between the post test scores of respiratory parameters among children with lower respiratory tract infections with their selected demographic variables in experimental group.

OBJECTIVE 1: Assess the pre test and post test scores of respiratory parameters among children with Lower respiratory tract infections in experimental group

Peak flow rate scores in pre test, 5(16.7%) children had severe grade, 17(56.7%) children had moderate grade and 8(26.6%) children had mild grade. In post test, 3(10%) children had moderate grade, 11 (40%) children had mild grade, and 16 (53.3%) had normal grade.

According to the forced expiratory volume scores in pre test, 25(83.3%) children had severe level, 3(10%) children had moderate level and 2(6.7%) children had mild level. In post test, 20(66.7%) children had normal, 6(20%) children had mild and 4(13.3%) had moderate level.

The study findings were consistent with the findings of **Pneumol.B.J., (2008)** In the comparative analysis, pre- and post-intervention values of maximal inspiratory pressure (48.32±5.7 to 109.92±18), maximal expiratory pressure (50.64±6.55 to 82.04±17.0) PEF (173.6±15.817 to 312±16.48) increased significantly in the exercise trained group: ($p < 0.0001$). In the control group, however, there were no significant differences between the two time points.

Lindmark., (2005) compared to the control subjects, the patients in the deep-breathing group had a significantly smaller reduction in FVC (to 71 ± 12%, vs 64 ± 13% of the values; $p = 0.01$) and FEV_1 (to 71 ± 11%, vs 65 ± 13% of the values; $p = 0.01$). 72% of the patients experienced a subjective benefit from the exercises.

OBJECTIVE 2: Assess the pre test and post test scores of respiratory parameters among children with Lower respiratory tract infections in control group

Peak flow rate scores in pre test, 4(13.3%) children had severe grade, 22(73.4%) children had moderate grade and 4(13.3%) children had mild grade. In post test, 2(6.7%) children had severe grade, 18(60%) children had moderate grade, 9(30%) had mild grade and 1(3.3%) child had normal grade.

According to forced expiratory volume, in pre test, 16(53.4%) children had severe level, 10(33.3%) children had moderate level and 4(13.3%) children had mild level. In post test, 15(50%) children had severe level, 7(23.3%) children had moderate level, 5(16.7%) children had mild level and 3(10%)had normal level.

The study findings were consistent with the findings of **Shashikala.L et.al., (2011**) effect of short term breathing exercises on pulmonary parameters are assessed among 30 subjects with lower respiratory infections admitted in pediatric inpatient unit in the age group of 5-12 . The peak expiratory flow rate

(150±0.7) and forced expiratory volume (1.54±0.34) were recorded. Second phase of recording was done after the exercise training for a week. Results showed a significant increase in the values of PEFR (180±0.06) and FEV_1 (2.11±0.70) in the second phase of reading.

OBJECTIVE 3: Compare the pretest and post test scores of respiratory parameters among children with Lower respiratory tract infections in experimental group.

Regarding peak flow rate, the post test mean score 176.4 (SD±60.87) higher than the pre test mean score 123.23 (SD±46.13) and mean difference was (53.17). The paired't' value was 8.54 (table value= 2.045) which is significant at $P< 0.05$ level. The finding revealed that there is a significant improvement in post test Peak flow rate in experimental group.

According to forced expiratory volume, the post test mean score 1.01 (SD±0.382) higher than the pre test mean score 0.60(SD±0.194) and mean difference was (0.41). The paired 't' value was 7.2 (table value= 2.045) which is significant at $P< 0.05$ level. The finding revealed that there is a significant improvement in forced expiratory volume in post test in experimental group.

This study findings were consistent with the findings of **Sodhi C., Singh S. and Dandona P.K. (2009),** the subjects in the experimental group showed a statistically significant increasing trend ($P < 0.01$) in peak expiratory flow rate ('t value =16.4), forced expiratory volume in the first second ('t'value=15.6), at 2 weeks as compared to control group. Thus, breathing exercises used adjunctively with standard pharmacological treatment significantly improves pulmonary functions in children with respiratory infections.

Hence the hypothesis H_1: The mean post test scores of respiratory parameters is significantly higher than the mean pre test scores in experimental group, was accepted.

OBJECTIVE 4: To find the effectiveness of breathing exercises as play way method on respiratory parameters among children with lower respiratory tract infections between experimental and control group.

The mean post test scores of peak flow rate in the experimental group 176.4 (SD±60.8) was significantly higher than the mean post test scores of peak flow rate in control group 109 (SD±46.3) and the mean difference was (66.5). Independent 't' value 7.82 (table value= 2.0017) which is significant at $P < 0.05$ level. The finding revealed that there is a significant improvement in peak flow rate between experimental group and control group, which showed that breathing exercises is effective for children with Lower respiratory tract infections.

The mean post test scores of forced expiratory volume in the experimental group 1.09 (SD±0.38) was significantly higher than the mean post test scores of forced expiratory volume in control group 0.67 (SD±0.21) and the mean difference was (0.42). Independent 't' value 4.49 (table value=2.0017) which is significant at $P < 0.05$ level. The finding revealed that there is a significant improvement in the forced expiratory volume between experimental group and control group, which showed that breathing exercises are effective for children with Lower respiratory tract infections.

The study findings were consistent with the findings of **Sakshi, Multani (2010)**. The calculated t value between the two groups came out to be 2.66 and its critical value is 1.63 ($p<0.10$). The overall improvement of lung function was significantly more in breathing exercise interventions than control group.

Hence the hypothesis H_2: The mean post test scores of respiratory parameters are significantly higher than the mean pre test scores among children with Lower respiratory tract infections in experimental group was accepted.

OBJECTIVE 5: Association between post test scores of respiratory parameters among children with Lower respiratory tract infections with their selected demographic variables in experimental group.

The study findings shows that, there was significant association found between peak flow rates in relation to frequency of attacks in the last year (χ^2=11.71) at ($P<0.05$) level. No significant association in respiratory parameters were found when compared to age, sex, education, residence, religion, pet animals in the house, type of allergy, duration of breast feeding and duration of illness at ($P < 0.05$) level in significance.

The study findings shows that, there was no significant association in forced expiratory volume found when compared to age, sex, education, residence, religion, pet animals in the house, type of allergy, duration of breast feeding, frequency of attacks in the last year and duration of illness at ($P <0.05$) level in significance.

The study findings were consistent with the findings of **Halonen.M et.al., (2010)** Children with more than one lower respiratory tract infection episode were more likely to decreased peak flow rate (chi square=19.21).

Hence the hypothesis H_3: There is a significant association between post test scores of respiratory parameters among children with Lower respiratory tract infections in experimental group with their selected demographic variables, was rejected except for frequency of attacks in the last year (χ^2=11.71).

CHAPTER – VI

SUMMARY, CONCLUSION, IMPLICATION RECOMMENDATIONS AND LIMITATIONS

This chapter deals with

- Summary of the study
- Conclusion
- Implication of nursing
- Recommendations
- Limitations

SUMMARY OF THE STUDY

The study was done to evaluate the effectiveness of breathing exercises as play way method on respiratory parameters among children with Lower respiratory tract infections.

The research design used for this study was quasi experimental non equivalent control group pre test and post test design. An evaluative approach was used. The study conducted in Masonic hospital and Child Trust Hospital at Coimbatore. Conceptual frame work adopted in the present study was Modified Pender's Health Promotion Model (Revised 2002).The sample size was 60 children with lower respiratory tract infections, 30 for experimental group were selected from Masonic Hospital and 30 for control group were selected from the Child Trust Hospital.

The investigator gave brief introduction to the children and their mothers who met inclusion criteria and were selected by using convenient sampling within the age of 5 to 12 years. Demographic variables were collected and Pre test was done for both experimental and control group by using digital peak flow meter. Then the intervention of breathing exercise as play way method were taught to child and made them to do exercises daily for 30 minutes in the morning and evening for 5 days in experimental group. Child was supervised by the investigator every session. In control group the existing hospital routine was practiced. Post test was done on fifth day by using micro life digital peak flow meter for both experimental and control groups.

The data was analyzed and tabulated using descriptive and inferential statistics. The effectiveness of breathing exercises as play way method was assessed by frequency, percentage, paired 't' test, independent 't' test. Chi-square test was used to find the association between respiratory parameters with their selected demographic variables among children with Lower respiratory tract infections in experimental group.

The major findings are summarized as follows

Distribution of demographic characteristics of the children with Lower respiratory tract infections

- In experimental group, majority 19(63.3%) children belong to the age of 5-12 years and in control group also majority 19(63.3%) children belong to the age of 5-12 years.
- In experimental group, majority 17(56.7%) children were male, and in control group, majority 18(60%) children were male.
- In experimental group, majority 12(40%) children belongs to II-III std and in control group, majority 10(33.3%) children belongs to II-III std
- In experimental group, majority 16(53.3%) children belongs to rural area and in control group, majority 16(53.3%) children belongs to urban area.
- In experimental group, highest percentage 22(73.4%) children were Hindu and in control group, highest percentage 21(70%) children were Hindu

- In experimental group, majority of the children 16(53.3%) children had pet animals at the home and in control group; highest percentage 20(66.7%) children had pet animals in the home.
- In experimental group, majority of the children 14(46.7%) children had no allergy, and in control group, majority 12(40%) children had dust allergy.
- In experimental group, majority 15(50%) children had 6 months to 1 year breast feeding and in control group; majority 17(56.7%) children had 1-2 year breast feeding.
- In experimental group, majority 23(76.7%) children had 1-2 attacks within a year and in control group, majority 25(83.3%) children had 1-2 attacks within a year.
- In experimental group, 15(50%) children had the duration of illness 0-1 year and in control group, 15(50%) children had the duration of illness between 0-1years.

In Experimental group**,** 17(56.7%) children had severe grade of peak flow rate in pre test. In post test, 11(36.7%) children had mild grade and 16(53.3%) children had normal grade of peak flow rate. In Control group, 22(73.4%) children had moderate grade of peak flow rate in pre test. In post test, 18(60%) children had moderate grade and 9(30%) children had mild grade of peak flow rate.

In experimental group forced expiratory volume scores in pre test, 25(83.3%) children had severe level, 3(10%) children had moderate level and 2(6.7%) children had mild level. In post test, 20(66.7%) children had normal, 6(20%) children had mild and 4(13.3%) had moderate level.

In experimental group, the post test mean score of peak flow rate 176.4 (SD±60.87) higher than the pre test mean score 123.23 (SD±46.13) and mean difference was (53.17). The paired‘t’ value was 8.54 (table value= 2.045) which is significant at $P < 0.05$ level. The finding revealed that, in experimental group there is a significant improvement in the post test Peak flow rate.

In experimental group the post test mean score of forced expiratory volume 1.01 (SD±0.382) higher than the pre test mean score 0.60(SD±0.194) and mean difference was (0.41). The paired 't' value was 7.2 (table value= 2.045) which is significant at $P < 0.05$ level. The finding revealed that there is a significant improvement in post test forced expiratory volume in experimental group.

The mean post test score of peak flow rate in the experimental group 176.4 (SD±60.87) was significantly higher than the mean post test score of peak flow rate in control group 109.93 (SD±46.37) and the mean difference was (66.5). Independent 't' value 7.82 (table value= 2.04) which is significant at $P < 0.05$ level. The finding revealed that there is a significant improvement in peak flow rates in experimental group than control group.

The mean post test score of forced expiratory volume in the experimental group 1.09 (SD±0.382) was significantly higher than the mean post test score of forced expiratory volume in control group 0.67 (SD±0.213) and the mean difference was (0.42). Independent 't' value 4.49 (table value= 2.04) which is significant at $P < 0.05$ level. The finding revealed that there is a significant improvement in forced expiratory volume in experimental group than control group.

The significant association was found between peak flow rates in relation to frequency of attacks in the last year ($\chi^2 = 11.71$) at ($P < 0.05$) level. No significant association in respiratory parameters were found when compared to age, sex, education, residence, religion, type of allergies, pet animals in the house, duration of breast feeding and duration of illness.

CONCLUSION

The present study evaluated the effectiveness of breathing exercises as play way method on respiratory parameters among children with Lower respiratory tract infections in selected Hospitals, Coimbatore. Based on statistical findings, it is evident that breathing exercises given among children with Lower respiratory tract infections significantly increased the peak flow rate (independent ‘t’ value=7.82) and forced expiratory volume (independent ‘t’ value=4.49). Therefore the investigator felt that, breathing exercises for children with Lower respiratory tract infections will improve the respiratory parameters.

IMPLICATIONS FOR NURSING

NURSING SERVICES

- ❖ Self instructional module regarding breathing exercises given by the health personnel will help the children to improve their knowledge on exercises.
- ❖ Nursing service department can arrange health education programmes in the outpatient department for teaching the children on breathing exercises.
- ❖ Nurses as a change agent can introduce various breathing measures to improve lung function among children with lower respiratory tract infections.

NURSING EDUCATION

- ❖ Imparting the concepts of promotive aspects in breathing exercises to nursing students.

- Nursing students must be encouraged to utilize knowledge on promotive measures to give health education and demonstration in hospital and community.

NURSING ADMINISTRATION

- Administrators should take initiative action to update the knowledge of nursing personnel regarding breathing exercises in improvement of lung function and reducing the signs of respiratory illness by in-service education.
- Nurse administrators can conduct workshop and seminars on breathing exercises for lower respiratory tract infections to all level of nursing personnel in the hospital.
- To organize awareness camp regarding breathing exercises for children on special days.

NURSING RESEARCH

- The study findings can be effectively utilized by the emerging researchers for their reference purpose.
- The research study enhances the scientific body of professional knowledge in the field of nursing science.

RECOMMENDATIONS

- Similar study can be done in different settings (rural and urban).
- Similar study can be replicated on larger samples there by findings can be generalized.
- A comparative study can also be done between the effectiveness of various non-pharmacological measures for improving lung function among children.

LIMITATIONS

- Since it is an exercise programme to the children, the researcher found difficulty in making them to understand and to co-operate to do the exercises.

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45. http://zhaodong@public.wh.hb.cn
46. http://www.virologyj.com/content/6/1/155
47. http://www.academicjournals.org/ajpp
48. http://www.ijponline.net/content/37/1/14
49. http://respiratory-reesearch.com/content/3/S1/S8
50. http://www.biomedcentral.com/1741-7015/7/35
51. http://creativecommons.org/licenses/by/2.0

52. http://intl.ajcn.org
53. http://www.archpediatrics.com

APPENDIX-A

MASONIC MEDICAL CENTRE FOR CHILDREN

(A UNIT OF COIMBATORE MASONIC CHARITY TRUST)

232, RACE COURSE ★ COIMBATORE - 641 018 ★ PHONE : 2220663 (6 Lines)

FAX : 0422-2221765 ★ E-mail : info@masonichospital.org

Date : ....

21st August, 2014

To

The Principal,
Bishop's College of Nursing,
C.S.I.Mission Compound,
Dharapuram – 638 656.
Tirupur Dist.

Madam,

With reference to your letter No. Nil dated 15.06.2014, we wish to inform you that we will permit your student **Ms. Josmy Geoge – II year M.Sc (N)** to do a project on **"A STUDY TO EVALUATE THE EFFECTIVENESS OF BREATHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN MASONIC HOSPITAL, COIMBATORE".**

A copy of this project report is to be submitted to the Hospital.

This is for your kind information.

Thanking you,

Yours faithfully,

(DR. R. KRISHNASWAMI)
CHIEF MEDICAL OFFICER.

APPENDIX-B

COIMBATORE CHILD TRUST HOSPITAL PVT. LTD.,

CCTH
111, Nanjappa Nagar, Trichy Road, Singanallur, Coimbatore - 641 005.
Ph : 0422 - 2576111, 222, 333, Mobile : 98428 11198
Email : ccth.cbe@gmail.com Web : www.coimbatorechildtrust.com
CIN No : U85110TZ2009PTCO15014

Date:.........................

21ST August, 2014

To

The Principal,
Bishop's College of Nursing,
C.S.I. Mission Compound,
Dharapuram – 638656
Tirupur – Dist.

Madam,

With reference to your letter No. Nil dated 15.06.2014, We wish to inform you that we will permit you student **MS. JOSMY GEORGE** – II Year M.Sc(N)., to do project on "**A STUDY TO EVALUATE THE EFFECTIVENESS OF BRAETHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN SELECTED HOSPITALS, COIMBATORE".**

Thanking you,

Your's faithfully,

(Dr.K.Neminathan)

Coimbatore Child Trust Hospital

Dr. K. NEMINATHAN
M.B.B.S.,DCH.,M.D.,(Texila American University)
Reg. No: 42904
Coimbatore Child Trust Hospital

APPENDIX-C

LETTER SEEKING EXPERTS OPINION FOR CONTENT VALIDITY

From

MS. JOSMY GEORGE
M.sc (Nursing) II Year,
Bishop's college of nursing,
Dharapuram.

To

Respected Madam / Sir,

Sub: Requisition for content validity of tool.

I am doing M.Sc(Nursing) II year in Bishop's College of Nursing, Dharapuram under The Tamil Nadu Dr.M.G.R. Medical university, Guindy, Chennai. As a partial fulfillment of my M.Sc(nursing) Degree Programme, I am conducting a research on**, "A study to evaluate the effectiveness of braething exercises as play way method on respiratory parameters among children with lower respiratory tract infections in selected hospitals, Coimbatore."**A tool has been developed for the research study. I am sending the above stated for your expert and valuable opinion. I will be thankful for your kind consideration. Kindly return it to the undersigned.

Thanking you,

Yours faithfully,

(JOSMY GEORGE)

Enclosure:

1) Certificate of content validity
2) Statement of problem, objectives, operational definition, hypothesis
3) Description of the tool and tool for data collection
4) Self addressed envelope

APPENDIX-D

CHILD HEALTH NURSING

LIST OF EXPERTS OF VALIDATION

1) **Dr. D.S.Arivanand**,MBBS, MD (Ped),
Maharishi Nursing Home,
Dharapuram.

2) **Prof. Mrs.M.Kavimani**

Principal,

Sivaparvathi Mandradiar Institute of Health Sciences,

Palayakotai.

3) **Prof. Mrs. X.Emerentia**
Vice Principal,
RVS College of Nursing,
Sulur,Coimbatore

4) **Mrs. N. Vijayalakshmi**
Professor
Child Health Nursing Department
K.G college of Nursing
Coimbatore.

5) **Mrs. Prabhavathy**

Principal,

Vellalar College of Nursing

Erode.

APPENDIX- E

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **"A STUDY TO EVALUATE THE EFFECTIVENESS OF BRAETHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN SELECTED HOSPITALS, COIMBATORE"** has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE :

NAME :

Dr.D.S.ARIVANAND,M.B.B.S.,M.D.(Ped),
Registration No : 57617
MAHARISHI NURSING HOME,
NEAR BUS STAND,
DHARAPURAM - 638656.

DESIGNATION :

COLLEGE :

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **"A STUDY TO EVALUATE THE EFFECTIVENESS OF BRAETHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN SELECTED HOSPITALS, COIMBATORE"** has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE : M. [signature]

NAME : M. KAVIMANI

DESIGNATION : PRINCIPAL

COLLEGE : SHIVPARVATHI MANDRADIAR INSTITUTE OF HEALTH SCIENCES PALAYAKOTAI-638 108.

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **"A STUDY TO EVALUATE THE EFFECTIVENESS OF BRAETHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN SELECTED HOSPITALS, COIMBATORE"** has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE :

NAME : X. Emerentia.

DESIGNATION : VICE PRINCIPAL

COLLEGE : RVS COLLEGE OF NURSING.

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **"A STUDY TO EVALUATE THE EFFECTIVENESS OF BRAETHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN SELECTED HOSPITALS, COIMBATORE"** has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE : N. Vijayalakshmi

NAME : N. VIJAYALAKSHMI

DESIGNATION : PROFESSOR

COLLEGE : K. G. COLLEGE OF NURSING, COIMBATORE.

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **"A STUDY TO EVALUATE THE EFFECTIVENESS OF BRAETHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN SELECTED HOSPITALS, COIMBATORE"** has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE : 29/1/2015

NAME :

DESIGNATION :

COLLEGE : Vellalar College of Nursing, Maruthi Nagar, Thindal, Erode - 638 012

APPENDIX- F

CERTIFICATE FOR ENGLISH EDITING

TO WHOMSOEVER IT MAY CONCERN

This is certify that the dissertation work, **A STUDY TO EVALUATE THE EFFECTIVENESS OF BRAETHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN SELECTED HOSPITALS, COIMBATORE" done by Ms. JOSMY GEORGE, II** Year M.S., (N) student of Bishop's College of Nursing, Dharapuram is edited for English language appropriateness by

SIGNATURE : Ravindran

NAME : GEETA RAVINDRAN
Professor
NCERC

DATE : 30/12/2014

ADDRESS : NADUVAKKAT KALAM
(POST) KONGAD
(DIST) PALAKKAD-678631

CERTIFICATE FOR TAMIL EDITING

TO WHOMSOEVER IT MAY CONCERN

This is certify that the dissertation work, **A STUDY TO EVALUATE THE EFFECTIVENESS OF BRAETHING EXERCISES AS PLAY WAY METHOD ON RESPIRATORY PARAMETERS AMONG CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS IN SELECTED HOSPITALS, COIMBATORE" done by Ms. JOSMY GEORGE, II** Year M.S., (N) student of Bishop's College of Nursing, Dharapuram is edited for Tamil language appropriateness by

SIGNATURE : ஓ.எம் செந்தில் குமார்

NAME : ஓ. எம். செந்தில்குமார்

DATE :

ADDRESS : O.M.SENTHIL KUMAR, M.A.,B.Ed.,M.Phil.
Guest Lecturer,
Department of Tamil,
Alagappa University Study Centre
DHARAPURAM 638656

DEMOGRAPHIC VARIABLES

1. **Age**
   a) 5-8 years
   b) 9- 12 years

2. **Sex**
   a) Male
   b) Female

3. **Education**
   a) UKG to I std
   b) II to III std
   c) IV to V std
   d) VI to VII std

4. **Residence**
   a) Rural
   b) Urban

5. **Religion**
   a) Hindu
   b) Christian
   c) Muslim

6. **Pet animals in house**
   a) Yes
   b) No

7. **Type of allergy**
   a) Dust
   b) Season
   c) Food

d) None

8. **Duration Of Breast Feeding**

a) 0-6 months
b) 6 months – 1 year
c) 1-2 years

9. **Frequency of attack in the last year**

a) 1 to 2 times
b) 3- 4 times
c) 5 and Above

10. **Duration of illness**

a. 0- 1 year
b. 2- 3years
c. 4 - 5 years
d. Above 5 years

TAMIL TOOL

கேள்விகள்

1) வயது

a) 5-8 வயது

b) 9- 12 வயது

2) பால்

a) ஆண்

b) பெண்

3) கல்வி

a) U.K .G - I

b) II -III

c) IV - V

d) VI - VII

4) மதம்

a) ஹிந்து

b) கிறிஸ்டியன்

c) முஸ்லிம்

5) வீட்டு செல்ல பிராணிகள்

a) ஆம்

b) இல்லை

6) இருப்பிடம்

a) கிராமம்

b) நகரம்

7) ஒவ்வாமை வகை

a) தூசி

b) பருவநிலை

c) உணவு

d) ஒன்றும் இல்லை

8) தாய்பால்

a) 0 - 6 மாதம்

b) 6 மாதம் - 1 வருடம்

c) 1 - 2 வருடம்

9) இதற்கு முந்தின வருடம் எத்தனை தடவை நுரையிரல் தோற்று ஏற்பட்டுள்ளது

a) 1 - 2 முறை

b) 3- 4 முறை

c) 5 க்கு மேல்

10) நோய் தோற்று எவளவு நாள் இருந்தது

a) 0- 1 வருடம்

b) 2 - 3 வருடம்

c) 4 -5 வருடம்

d) 5 வருடத்திற்கு மேல்

MALES Height (cm)

Age	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195
5	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
7	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
9	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
11	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
13	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
15	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
17	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
19	313	331	350	368	387	405	423	442	460	479	497	516	534	552	571	589	608	626	644	663
21	313	331	350	368	387	405	423	442	460	479	497	516	534	552	571	589	608	626	644	663
23	313	331	350	368	387	405	423	442	460	479	497	516	534	552	571	589	608	626	644	663
25	313	331	350	368	387	405	423	442	460	479	497	516	534	552	571	589	608	626	644	663
27	308	326	345	363	381	400	418	437	455	474	492	510	529	547	566	584	602	621	639	658
29	303	321	339	358	376	395	413	432	450	468	487	505	524	542	560	579	597	616	634	653
31	297	316	334	353	371	390	408	426	445	463	482	500	518	537	555	574	592	611	629	647
33	292	311	329	348	366	384	403	421	440	458	476	495	513	532	550	569	587	605	624	642
35	287	306	324	342	361	379	398	416	434	453	471	490	508	527	545	563	582	600	619	637
37	282	300	319	337	356	374	392	411	429	448	466	485	503	521	540	558	577	595	614	632
39	277	295	314	332	350	369	387	406	424	443	461	479	498	516	535	553	572	590	608	627
41	272	290	308	327	345	364	382	401	419	437	456	474	493	511	530	548	566	585	603	622
43	266	285	303	322	340	359	377	395	414	432	451	469	488	506	524	543	561	580	598	616
45	261	280	298	317	335	353	372	390	409	427	446	464	482	501	519	538	556	574	593	611
47	256	275	293	311	330	348	367	385	404	422	440	459	477	496	514	532	551	569	588	606
63	215	233	252	270	289	307	325	344	362	381	399	417	436	454	473	491	510	528	546	565
65	210	228	247	265	283	302	320	339	357	375	394	412	431	449	468	486	504	523	541	560
67	205	223	241	260	278	297	315	333	352	370	389	407	426	444	462	481	499	518	536	555
69	199	218	236	255	273	291	310	328	347	365	384	402	420	439	457	476	494	513	531	549
71	194	213	231	249	268	286	305	323	342	360	378	397	415	434	452	471	489	507	526	544
73	189	207	226	244	263	281	300	318	336	355	373	392	410	429	447	465	484	502	521	539
75	184	202	221	239	258	276	294	313	331	350	368	387	405	423	442	460	479	497	515	534
77	179	197	216	234	252	271	289	308	326	345	363	381	400	418	437	455	473	492	510	529
79	174	192	210	229	247	266	284	303	321	339	358	376	395	413	431	450	468	487	505	524
81	168	187	205	224	242	261	279	297	316	334	353	371	389	408	426	445	463	482	500	518
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	'95	513
																			90	508
																			85	503
																			79	498
																			74	493
																			69	487
																			64	482
97	127	146	164	182	201	219	238	256	275	293	311	330	348	367	385	403	422	440	459	477
99	122	140	159	177	196	214	233	251	269	288	306	325	343	361	380	398	417	435	454	472

- ERS 93 "Standardization of Lung Function Tests", Official Statement of the European Respiratory Society. [Age range 18 -70].
- Polgar 79, Polgar G., Weng T.R.; The Functional Development of the Respiratory System, ARRD, 120, 1979. [Age range 5-17].

ERS'93 / Polgar '79

PEF PREDICTED

Vitalograph

FEMALES Height (cm)

Age	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195
5	108	133	157	181	205	230	254	278	302	327	351	375	399	424	448	472	496	521	545	569
7	108	133	157	181	205	230	254	278	302	327	351	375	399	424	448	472	496	521	545	569
9	108	133	157	181	205	230	254	278	302	327	351	375	399	424	448	472	496	521	545	569
11	108	133	157	181	205	230	254	278	302	327	351	375	399	424	448	472	496	521	545	569
13	108	133	157	181	205	230	254	278	302	327	351	375	399	424	448	472	496	521	545	569
15	108	133	157	181	205	230	254	278	302	327	351	375	399	424	448	472	496	521	545	569
17	108	133	157	181	205	230	254	278	302	327	351	375	399	424	448	472	496	521	545	569
19	218	235	251	268	284	301	317	334	350	367	383	400	416	433	449	466	482	499	515	532
21	218	235	251	268	284	301	317	334	350	367	383	400	416	433	449	466	482	499	515	532
23	218	235	251	268	284	301	317	334	350	367	383	400	416	433	449	466	482	499	515	532
25	218	235	251	268	284	301	317	334	350	367	383	400	416	433	449	466	482	499	515	532
27	215	231	248	264	281	297	314	330	347	363	380	396	413	429	446	462	479	495	512	528
29	211	228	244	261	277	294	310	327	343	360	376	393	409	426	442	459	475	492	508	525
31	208	224	241	257	274	290	307	323	340	356	373	389	406	422	439	455	472	488	505	521
33	204	221	237	254	270	287	303	320	336	353	369	386	402	419	435	452	468	485	501	518
35	200	217	233	250	266	283	299	316	332	349	365	382	398	415	431	448	464	481	497	514
37	197	213	230	246	263	279	296	312	329	345	362	378	395	411	428	444	461	477	494	510
39	193	210	226	243	259	276	292	309	325	342	358	375	391	408	424	441	457	474	490	507
41	190	206	223	239	256	272	289	305	322	338	355	371	388	404	421	437	454	470	487	503
43	186	203	219	236	252	269	285	302	318	335	351	368	384	401	417	434	450	467	483	500
45	182	199	215	232	248	265	281	298	314	331	347	364	380	397	413	430	446	463	479	496
47	179	195	212	228	245	261	278	294	311	327	344	360	377	393	410	426	443	459	476	492
49	175	192	208	225	241	258	274	291	307	324	340	357	373	390	406	423	439	456	472	489
51	172	188	205	221	238	254	271	287	304	320	337	353	370	386	403	419	436	452	469	485
53	168	185	201	218	234	251	267	284	300	317	333	350	366	383	399	416	432	449	465	482
55	164	181	197	214	230	247	263	280	296	313	329	346	362	379	395	412	428	445	461	478
57	161	177	194	210	227	243	260	276	293	309	326	342	359	375	392	408	425	441	458	474
59	157	174	190	207	223	240	256	273	289	306	322	339	355	372	388	405	421	438	454	471
61	154	170	187	203	220	236	253	269	286	302	319	335	352	368	385	401	418	434	451	467
63	150	167	183	200	216	233	249	266	282	299	315	332	348	365	381	398	414	431	447	464
65	146	163	179	196	212	229	245	262	278	295	311	328	344	361	377	394	410	427	443	460
67	143	159	176	192	209	225	242	258	275	291	308	324	341	357	374	390	407	423	440	456
69	139	156	172	189	205	222	238	255	271	288	304	321	337	354	370	387	403	420	436	453
71	136	152	169	185	202	218	235	251	268	284	301	317	334	350	367	383	400	416	433	449
73	132	149	165	182	198	215	231	248	264	281	297	314	330	347	363	380	396	413	429	446
75	128	145	161	178	194	211	227	244	260	277	293	310	326	343	359	376	392	409	425	442
77	125	141	158	174	191	207	224	240	257	273	290	306	323	339	356	372	389	405	422	438
79	121	138	154	171	187	204	220	237	253	270	286	303	319	336	352	369	385	402	418	435
81	118	134	151	167	184	200	217	233	250	266	283	299	316	332	349	365	382	398	415	431
83	114	131	147	164	180	197	213	230	246	263	279	296	312	329	345	362	378	395	411	428
85	110	127	143	160	176	193	209	226	242	259	275	292	308	325	341	358	374	391	407	424
87	107	123	140	156	173	189	206	222	239	255	272	288	305	321	338	354	371	387	404	420
89	103	120	136	153	169	186	202	219	235	252	268	285	301	318	334	351	367	384	400	417
91	100	116	133	149	166	182	199	215	232	248	265	281	298	314	331	347	364	380	397	413
93	96	113	129	146	162	179	195	212	228	245	261	278	294	311	327	344	360	377	393	410
95	92	109	125	142	158	175	191	208	224	241	257	274	290	307	323	340	356	373	389	406
97	89	105	122	138	155	171	188	204	221	237	254	270	287	303	320	336	353	369	386	402
99	85	102	118	135	151	168	184	201	217	234	250	267	283	300	316	333	349	366	382	399

• ERS 93 “Standardization of Lung Function Tests”, Official Statement of the European Respiratory Society. [Age range 18 -70].

• Polgar 79, Polgar G., Weng T.R.; The Functional Development of the Respiratory System, ARRD, 120, 1979. [Age range 5-17].

SPIROMETRY PREDICTED VALUES FOR CHILDREN (POLGAR)

BOYS 1-17 PREDICTED VALUES

Height(cm)	Units	90	95	100	105	110	115	120	125	130	135	140
VC	L	0.66	0.77	0.88	1.01	1.16	1.31	1.48	1.65	1.85	2.05	2.27
FVC	L	0.66	0.77	0.88	1.01	1.16	1.31	1.48	1.65	1.85	2.05	2.27
FEV1	L	0.62	0.72	0.84	0.96	1.09	1.24	1.39	1.56	1.74	1.94	2.14
FEV1/VC		0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94
FEF 25-75%	L/s	0.42	0.65	0.87	1.10	1.33	1.55	1.78	2.01	2.23	2.46	2.69
PEF	L/min	35	63	91	119	147	175	203	231	259	287	315

Height(cm)	Units	145	150	155	160	165	170	175	180	185	190	195
VC	L	2.51	2.76	3.03	3.31	3.61	3.93	4.26	4.61	4.98	5.37	5.77
FVC	L	2.51	2.76	3.03	3.31	3.61	3.93	4.26	4.61	4.98	5.37	5.77
FEV1	L	2.37	2.60	2.85	3.12	3.40	3.69	4.01	4.33	4.68	5.04	5.42
FEV1/VC		0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
FEF 25-75%	L/s	2.91	3.14	3.37	3.59	3.82	4.05	4.27	4.50	4.73	4.95	5.18
PEF	L/min	343	371	398	426	454	482	510	538	566	594	622

Ref: Polgar G., Weng T.R.; The Functional Development of the Respiratory System - From the Period of Gestation to Adulthood, American Review of Respiratory Disease, Vol. 120, No. 3, September 1979.

SPIROMETRY PREDICTED VALUES FOR CHILDREN (POLGAR)

GIRLS 1 -17 PREDICTED VALUES

Height(cm)	Units	90	95	100	105	110	115	120	125	130	135	140
VC	L	0.63	0.74	0.85	0.97	1.11	1.25	1.41	1.58	1.76	1.96	2.16
FVC	L	0.63	0.74	0.85	0.97	1.11	1.25	1.41	1.58	1.76	1.96	2.16
FEV1	L	0.62	0.72	0.84	0.96	1.09	1.24	1.39	1.56	1.74	1.94	2.14
FEV1/VC		0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	0.99
FEF 25-75%	L/s	0.42	0.65	0.87	1.10	1.33	1.55	1.78	2.01	2.23	2.46	2.69
PEF	L/min	60	84	108	133	157	181	205	230	254	278	302

Height(cm)	Units	145	150	155	160	165	170	175	180	185	190	195
VC	L	2.39	2.62	2.87	3.14	3.42	3.71	4.03	4.35	4.70	5.06	5.44
FVC	L	2.39	2.62	2.87	3.14	3.42	3.71	4.03	4.35	4.70	5.06	5.44
FEV1	L	2.37	2.60	2.85	3.12	3.40	3.69	4.01	4.33	4.68	5.04	5.42
FEV1/VC		0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
FEF 25-75%	L/s	2.91	3.14	3.37	3.59	3.82	4.05	4.27	4.50	4.73	4.95	5.18
PEF	L/min	327	351	375	399	424	448	472	496	521	545	569

Ref: Polgar G., Weng T.R.; The Functional Development of the Respiratory System - From the Period of Gestation to Adulthood, American Review of Respiratory Disease, Vol. 120, No. 3, September 1979.

ERS'93/ Polgar 79 **PEF PREDICTED** **VITALOGRAPH**

MALES Height (cm)

Age	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195
5	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
7	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
9	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
11	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
13	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
15	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
17	91	119	147	175	203	231	259	287	315	343	371	398	426	454	482	510	538	566	594	622
19	313	331	350	368	387	405	423	442	460	479	497	516	534	552	571	589	608	626	644	663
21	313	331	350	368	387	405	423	442	460	479	497	516	534	552	571	589	608	626	644	663
23	313	331	350	368	387	405	423	442	460	479	497	516	534	552	571	589	608	626	644	663
25	313	331	350	368	387	405	423	442	460	479	497	516	534	552	571	589	608	626	644	663
27	308	326	345	363	381	400	418	437	455	474	492	510	529	547	566	584	602	621	639	658
29	303	321	339	358	376	395	413	432	450	468	487	505	524	542	560	579	597	616	634	653
31	297	316	334	353	371	390	408	426	445	463	482	500	518	537	555	574	592	611	629	647
33	292	311	329	348	366	384	403	421	440	458	476	495	513	532	550	569	587	605	624	642
35	287	306	324	342	361	379	398	416	434	453	471	490	508	527	545	563	582	600	619	637
37	282	300	319	337	356	374	392	411	429	448	466	485	503	521	540	558	577	595	614	632
39	277	295	314	332	350	369	387	406	424	443	461	479	498	516	535	553	572	590	608	627
41	272	290	308	327	345	364	382	401	419	437	456	474	493	511	530	548	566	585	603	622
43	266	285	303	322	340	359	377	395	414	432	451	469	488	506	524	543	561	580	598	616
45	261	280	298	317	335	353	372	390	409	427	446	464	482	501	519	538	556	574	593	611
47	256	275	293	311	330	348	367	385	404	422	440	459	477	496	514	532	551	569	588	606

the back straight.

- Take a deep breath focusing only on breathing. Feel the air comes into the lungs.
- Gently blow through the 'o' shaped mouth of a bubble wand dipped in its solution to produce bubbles.
- Do this at least for 5 minutes for getting into a relaxed state.
- Try for several breaths. To make breathing as slow
- Continue to focus on breathing; try to exhale completely pushing all the air out of the lungs.
- Inhale very slowly and fill the lungs back with fresh air.

BLOWING COTTON WOOL BALLS:

Place a cotton wool ball on open, flat palm and ask child to take a big breath in and then blow the ball off the hand.

Strategy to perform:

- Sit in a comfortable position with spine straight.
- With mouth gently closed, breathe in as fast as possible.
- Blow over the cotton balls on the palm, to blow it to a maximum distance the child can.

- While doing this exercise the child should feel effort at the base of the neck, chest and abdomen. The muscles in this area will increase in strength the more this technique is practiced.
- Repeat several times at least for five minutes.

BLOW BOTTLE EXERCISE:

Blow bottle exercises improve the pulmonary function. Bottle blowing helps to reduce symptoms of respiratory distress thereby reducing hospital stay for children.

Strategy to perform:

- Take two bottles two litre and one litre respectively.
- Fill the first bottle with 80% of water and keep second bottle empty. Use attractive colours to the water by adding food colours.
- Close the bottles air tight and connect them with rubber tubing of 10mm diameter.
- Place one inlet tubing in first bottle to blow through, to facilitate maximum escape of fluid to the second bottle within one breath.
- Repeat for 5 minutes.

PURSED LIP BREATHING:

Pursed lip breathing is the simplest way to control shortness of breath. It provides a quick and easy way to slow pace of breathing making each breath more effective.

Strategy to perform:

- Relax the neck and shoulder muscles.
- Breathe in slowly through the nose for two counts. Keeping the mouth closed. It may help to count inhale one and two.
- Pucks or purse the lips as gently as to flicker the flame of a candle
- Breathe out slowly and gently through pursed lips while counting four.
- Repeat for 5 minutes.

BLOWING

Blowi intercostals muscles responsible for spreading and elevating the diaphragm and rib cage. This allows lungs to absorb oxygen alter its chemical composition and exhale carbon dioxide as exhaling commenced.

Strategy to Perform:

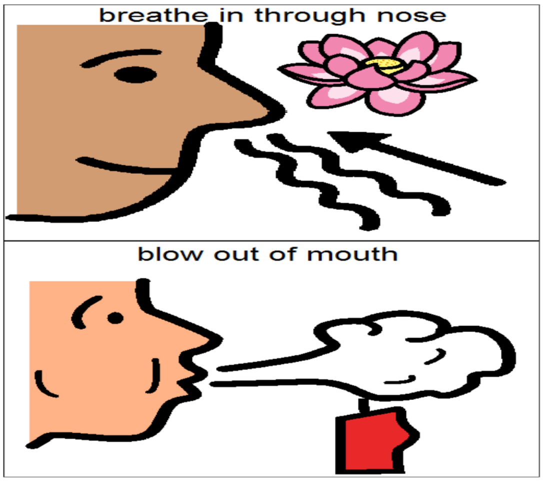
- Obtain a party balloon; loosen the balloon by stretching it in all directions.
- Grasp the end of the balloon ¼ inch below the lip of the opening between the index finger and thumb.
- Take a deep breath and seal the lips around the balloon.
- Blow the maximum of the air from the lungs into the balloon.
- Repeat for 5 minutes.

CANDLE AND FLOWER:

This technique helps to deliver oxygen and also helps to eliminate waste in the body and helps maintaining the healthy cells.

Strategy to perform:

- Gather together a lighted candle and flower
- Starting with the flower, have the child to take a deep breath (remind them slow and deep) through their nose as if they are smelling a flower.
- Instruct them to hold the breath for 2 seconds.
- Then release the breath slowly to blow off the candle.
- Repeat for 5 minutes.



APPENDIX- I
PHOTOS